VENTILATING

A MONTHLY MAGAZINE FOR ENGINEERS AND CONTRACTORS CONCERNED WITH COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL AIR CONDITIONING, REFRIGERATION, AIR SANITATION, PIPING, HEATING AND VENTILATION

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Advertising Representatives

Eastern Representative
HARRY J. TWINE
148 Lafayette Street
New York 13, N. Y.

Western Representative
GEORGE G. TURNER
228 North La Salle Street
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THIS MONTH'S COVER

Gipson photo from Frederic Lewis shows the effect of non-control of airborne pollen. See page 63. Photo on page 63 is by Larsen.

Now ALL TRANE PRODUCTS ARE BACK AGAIN!

How Many of These Heating Veterans Do You Know?

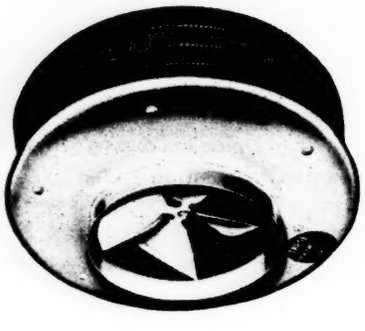
They're back—after almost four years of meritorious service all Trane Heating Products are back again, built with the original materials that Trane designers specified. Again they are available for construction projects of all kinds. For remodeling out-of-date heating plants. For repair and replacement.

And they're better than when they went away. Even though there has been a war, the past five years have been almost normal from the standpoint of product development and improvement. Product refinement has gone on uninterrupted. For example, the Trane Unit Heater of 1945 is better than that produced in 1940, just as the 1940 model was better than the 1935 heater.

Some new products have been added and you'll want to know about them too.

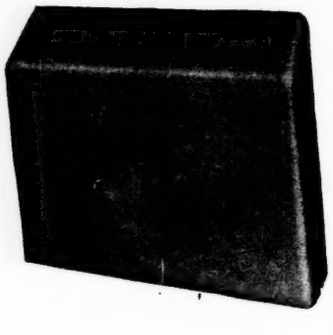
Now, see for yourself how many of the heating veterans and recruits you really know—

Try this Trane Quiz



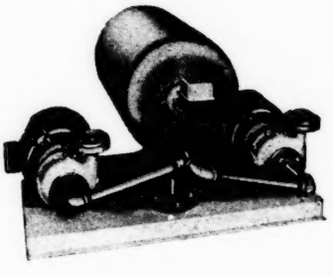
This is a.....?

Trane Projection Heater—the only new development in the unit heater field in more than fifteen years and one of three types that make the Trane Unit Heater Line the most complete available.



This is a.....?

Trane Convector-radiator, the modern successor to the old-fashion radiator. Easy to install, clean, attractive in appearance, an ideal heating unit for many applications.

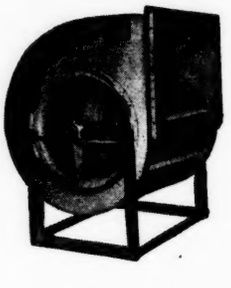


This is a.....?

Trane Condensation Pump, one of several different models and sizes which include single and duplex arrangements for uninterrupted and long time service.

This is a.....?

Trane Radiator Valve and Trap, the happy combination that makes any low pressure steam unit work better. Valve is truly packless and will last a lifetime. The Trap contains the well known Trane Bellows.



This is a.....?

Trane Centrifugal Fan from a wide line including blowers with either forward curved and backwardly inclined blades, utility blowers as well as propeller fans, in a wide range of sizes.

Washington News

LORING F. OVERMAN

Senators quiz Bowles and Snyder.
Make home construction healthy, says Snyder.
Cap house prices, says Bowles.
Products price increases granted.
CPA takes over.
WPB issues farewell document.

THE heating, ventilating and air-conditioning industry's segment concerned with industrial and commercial buildings, institutions, large residential projects and transportation media was distinctly in the middle of things during Washington's October.

While this segment of industry was given little direct attention by reconversion policy-makers, its "middle position" was due to the fact that it is linked inseparably with the construction industry as a whole—the subject of heated discussions before the Complaints Committee of the Senate Small Business Committee on October 24, with OPA Administrator Chester Bowles and War Mobilization and Reconversion Director John W. Snyder among those testifying.

Major topic was the need for preventing inflation in the field of small homes, but one of WMR Director Snyder's conclusions was to the effect that unless small home construction can be placed on a healthy basis, scarce materials and the limited construction labor available will be preempted by commercial and industrial builders. Although conceding that construction in the commercial and industrial field is also vitally needed for business expansion, Mr. Snyder concluded that providing medium priced houses for returning servicemen is an obligation which must not be overlooked. The demand for houses during the next year, he indicated, may be four or five times as great as any possible supply.

Those whose immediate concern involves the commercial and industrial building rather than the small home may regard it as significant that WMR Director Snyder concedes that reorganization of the small homes industry will be exceedingly difficult. Skilled workers of the building trades and allied supply lines have been scattered during the war, he observed, and the number of contractors engaged in direct construction and maintenance work has fallen from 500,000 in March, 1940 to 140,000 now.

Price Administrator Firm

Although WMR Director Snyder told Senators that some favorable progress was being made through a Six-Point Program announced by OWMR at the time Construction Order L-41 was revoked (effective October 15), Price Administrator Bowles is convinced that the 6 points will fail unless two more are added. The two points he is urging Congress to provide (and with indifferent success to date) would place specific ceiling prices on both new and existing homes.

It is interesting to watch Chester Bowles plead his case for continued price controls, and his presentation on the subject of housing was no exception. It should be remembered that Mr. Bowles was a top-flight advertising agency executive before taking over the OPA assignment. His success in the agency field was predicated upon being able to analyze markets and build sales for his clients' products. Thus in his present role of sitting on the price lid—much to the dissatisfaction of many of those who once accepted his professional advice on advertising matters—he cannot be accused of any professorial unfamiliarity with the needs of Business.

His presentations of price proposals are frequently supplemented by charts and graphs prepared with an advertising man's technique. His strongest points, however, are his obvious sincerity of purpose and the recognition by listeners that his recommendations are his firm convictions, let the chips fall where they may. Backed by such a setting, it is difficult for listeners, Senators included, to turn a deaf ear when he says:

"The government has no authority to control the selling prices of finished houses, and that is a crippling weakness in the whole program. Prices of finished houses are free to soar dizzly beyond the reach of the average family.

"Builders who are willing to take advantage of this situation can make fantastic profits at the expense of the veteran, and eventually at the expense of the whole economy. While supplies of building materials remain short, the irresponsible speculative builder can freely outbid those who want to build or repair their own homes. In this setting the black market in building materials will be difficult if not impossible to control. Thousands of families will find themselves unable to afford their dream houses. Reputable builders will not be able to hold the line against such irresponsible competition for building materials. And the industry will be on the way to pricing itself out of business as it did after the last war.

"That is why I urge with all the force I have, that the Congress enact legislation to stop this onrushing inflation of home prices in its tracks at the earliest possible moment.

2-Point Supplement Urged

"Many proposals have been explored in recent weeks. It seems to me that the following plan used in conjunction with the six-point program (see footnote) offers the best chance of succcess.

"First, it would prevent speculative buying and reselling of existing homes. The price at which any existing home is first sold after the passage of the legislation would automatically become the ceiling price on that home in case of a future sale. Obviously this arrangement would place no restriction on the price which the present owner would receive on the first sale.

"Provision should be made of course for adjustment of ceiling in cases where improvements have been made after the first sale or where special circumstances surrounded the first sale. It would be proper also to provide that the customary real estate commission be added to the ceiling price so that a person who buys a home and later decided to sell will not have to take a loss.

"Second, the plan would establish price ceilings on new homes. These ceilings would be set sufficiently high to cover all costs of production (not in excess of legal price ceilings for materials and services) plus a generous profit margin for the builder or developer. In order to assure maximum production, profits should be based on the highest earnings of the industry in recent pre-war years.

"This is a moderate proposal. I believe that the big majority of thinking people in the real estate industry will understand the need for such a program and help to make it work for their own protection as well as for the protection of the economy in the years ahead. These people know that sound, long-range business cannot be built on runaway costs and inflated prices."

Price Increase Granted

Intended to be of direct assistance to the heating, ventilating and air-conditioning industry is Amendment

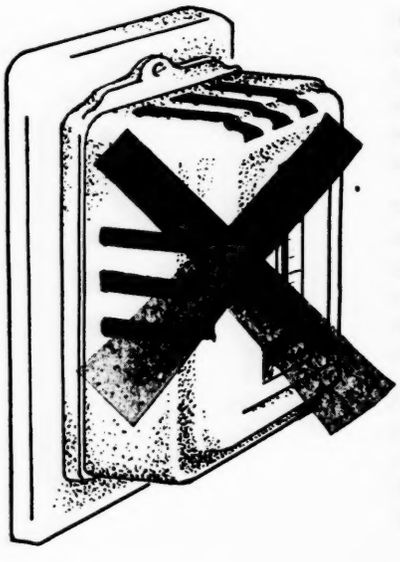
FUNCTIONAL BEAUTY

TRIMTHERM

ACCURATE ROOM TEMPERATURE CONTROL

The harmonizing dull chrome cover is the thermally responsive mechanism, unhoused and exposed to immediate radiant heat and temperature change. Extends only 7/8" from wall. Ivory plastic base thermally isolates instrument from wall.

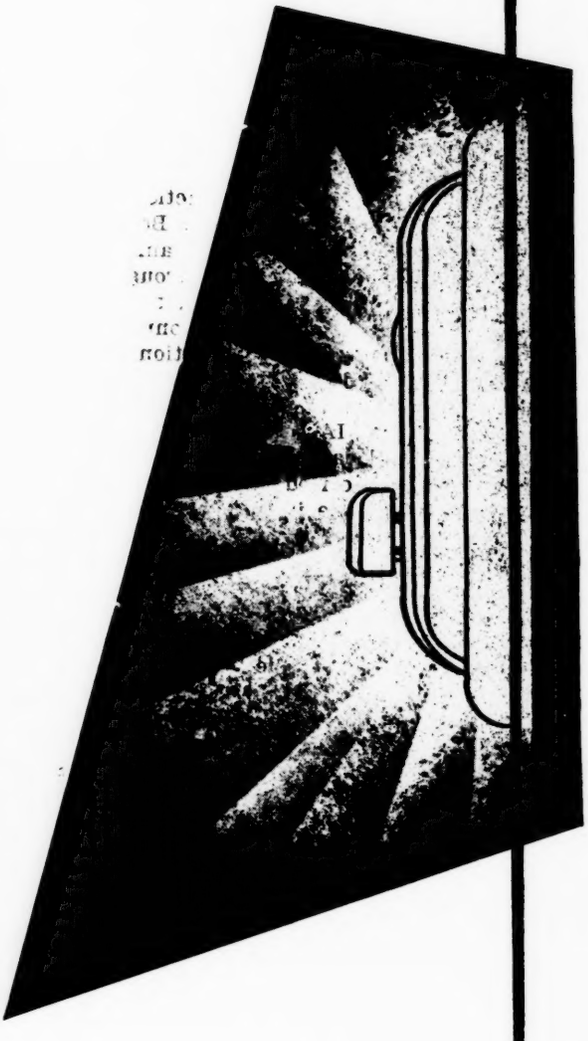
GENERAL CONTROLS' T-80 Series Trimtherm has set a new standard of accuracy in remote control of room temperatures. Its remarkable sensitivity insures a differential of only ½°F. Its dull chrome cover, streamlined design and flush mounting harmonize with any scheme of room decoration. The Trimtherm is truly an example of functional beauty.



Compare the conventional type thermostat (left) where air has to pass through louvers in the housing to reach sensitive element, with the compact Trimtherm, which typifies the ultimate in modern engineering design, a thermostat that lives thermally in the room.

T-80 Series Trimtherm available only for use with All-Gas-Control system. Package Sets include a B-60 Series Gas Control Valve, Thermocouple Pilot Generator (no outside current required), 30 feet of thermostatic wire and a T-80 Series Trimtherm.

FOR COMPLETE SPECIFICATIONS on temperature, pressure and flow controls for commercial and domestic applications in the Gas Industry, write for Catalog 52-B, or contact Factory Branch or Distributor near you.



GENERAL CONTROLS
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KANSAS CITY • NEW YORK • DENVER • DETROIT • CLEVELAND • PITTSBURGH
HOUSTON • SEATTLE • SAN FRANCISCO • **DISTRIBUTORS IN PRINCIPAL CITIES**

No. 1 to Maximum Price Regulation No. 591, issued October 26 to permit manufacturers of boilers, radiators, plumbing fixtures and valves to apply for price increases when they face over-all loss, whether or not the products involved qualify as "essential" or as "low priced." Previous to issuance of the amendment, price relief was available to loss producers of mechanical building materials only when the products were considered essential to the nation's war economy, or when existing ceilings were at the low end of the price scale.

A profit factor for commercial refrigerators of 4.9% has been established by the OPA in amendment No. 4 to Supplementary Order No. 119—Individual Adjustments for Reconverting Manufacturers, effective Oct. 3.

The products to which this OPA order applies include display cases, reach-in refrigerators, water coolers, ice cream cabinets, other types of commercial refrigeration equipment, and all types of air conditioning equipment, (apparently either built for remote installation or self-contained).

The matter of whether or not it includes condensing units is in doubt. Some manufacturers of condensing units have been known to have received price adjustments under MPR 591. This would mean that condensing units are being considered as a component, rather than a complete piece of equipment.

The October 26 action of OPA liberalizes the relief provisions of the mechanical building materials regulation to bring them in line with provisions being added to regulations governing other scarce items, such as brick, sand, gravel and refractory materials. Price increases will not be granted, OPA pointed out, to compensate for temporary or non-recurring factors, inadequate plant utilization, illegal wage payments, excessive overhead or increases over pre-war costs of selling.

(The relief provisions of the pricing regulations, designed to break bottlenecks in the construction field, are in line with the OWMR 6-Point program outlined in the footnote at the conclusion of this column.

CPA Continues IAC

Even before the Civilian Production Administration took over after the War Production Board's discontinuance on November 3, the new CPA announced that it will retain contact with industry through the 176 Industry Advisory Committees, including two representing heating, ventilating and air-conditioning interests. To be called for reconversion consultation will be members of the Plumbing and Heating Manufacturers Industry Advisory Committee and the General Refrigeration and Air Conditioning IAC.

The CPA will have six main functions:

1. To use authorized powers to expand production of materials which are in short supply.
2. To limit the use of materials which are still scarce.
3. To restrict the accumulation of inventories so as to avoid speculation, hoarding, and unbalanced distribution which would curtail total production.
4. To grant priorities assistance to break bottlenecks which threaten to impede the reconversion process.
5. To facilitate the fulfillment of relief and other essential export programs.
6. To allocate scarce materials or facilities necessary for the production of low priced items essential to the continued success of the stabilization program.

CPA Eyes Foundry Bottleneck

One of the first bottleneck industries to attract the attention of CPA involves foundries, currently lagging in the production of castings. Production is now running at a 9,000,000 ton annual rate and must be lifted to about 12,000,000 tons annually to meet reconversion demands. A theoretical capacity of 19,000,000 tons is claimed for the industry, which, however, has never exceeded an annual production of much more than 11,000,000 tons. Current order backlogs range to more than eight months in some foundries, with new reconversion business piling up.

CPA efforts will include assistance in expanding facilities, and an effort to recruit a total of 70,000 additional workers, 20,000 of them needed immediately. The foundry bottleneck is affecting the automotive industry, farm machinery, and manufacturers of washing and sewing machines, refrigerators, fractional horsepower motors, stoves, building hardware, household heating equipment, radiators, cast iron soil pipe and many others.

WPB Issues Farewell Summary

One of the final official acts of J. A. Krug, Chairman of the War Production Board, was to issue WPB Document 334, "Wartime Achievements and the Reconversion Outlook"—a publication well worth more than a passing glance by those in adding to their files a summary of Industry's war record. In 114 typed and offset pages, the report traces major production problems from pre-war to post-war times, with current summaries of the reconversion outlook. Copies may be secured by writing Inquiry Section, War Production Board, Room 1501 Social Security Building, Washington 25, D. C.

Encouraging to those planning bigger and better things in heating, ventilating and air-conditioning for tomorrow's industry are some of Mr. Krug's observations.

"We have come out of war knowing a great deal more about how to produce efficiently, speedily and cheaply than we knew when we went in," he comments. "Manufacturers are eager to put their increased knowledge to use. That requires plants adaptable to the new techniques, and adequate modern equipment. Expansions, alterations and additions to manufacturing plants are now under way on a large scale. It is already evident that despite the fears of pessimists, who pointed to the large number of surplus war plants and large stocks of surplus tools which would overhang the market after the war, a substantial volume of factory construction and equipment purchase is in prospect.

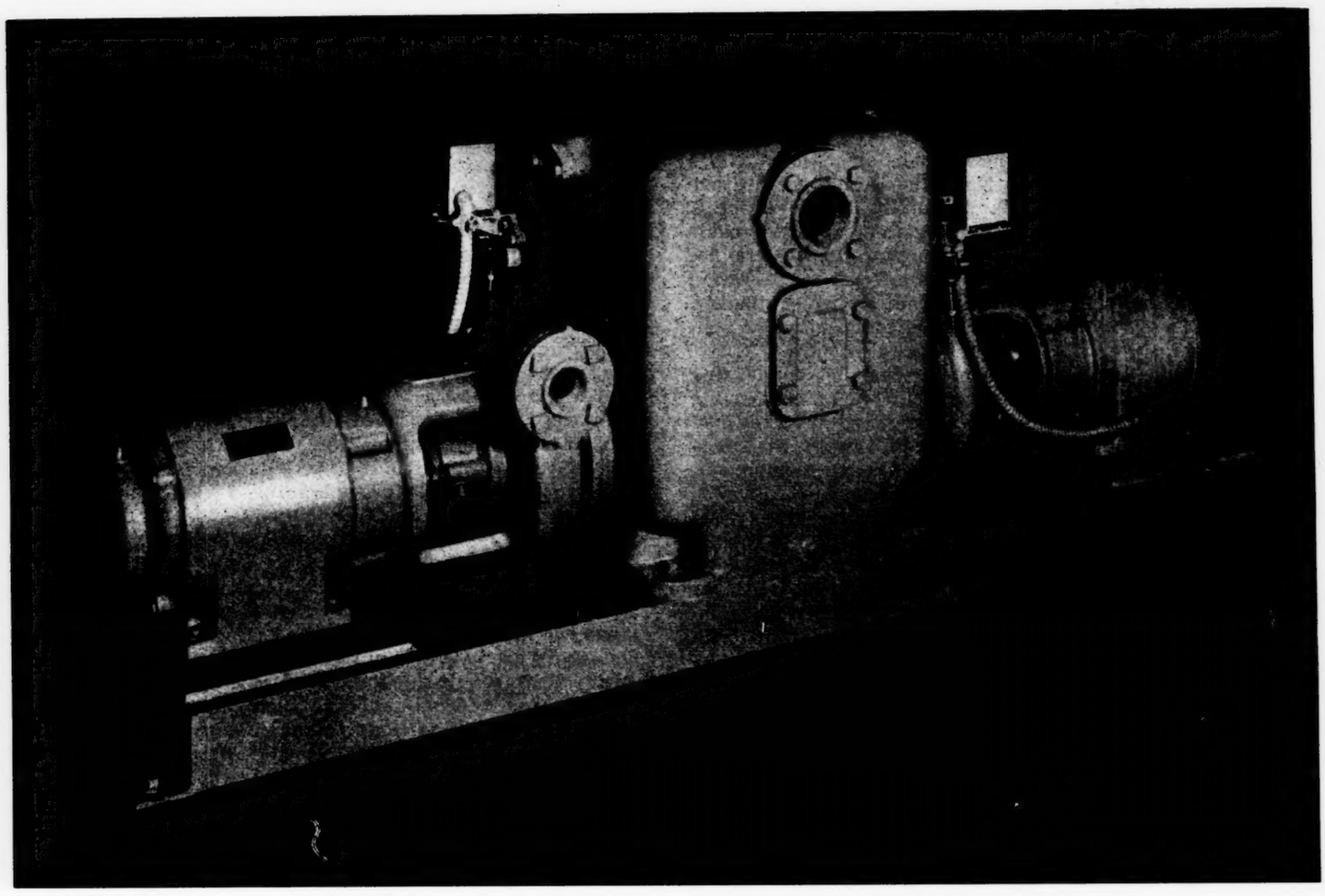
"Not that these surpluses do not exist or that we should condone the economic waste involved in scrapping any of them which can be usefully employed to provide employment and produce goods for which there is a market. But in a partial sample of 4,000 companies in 41 industries, we found that facilities expansion totalling over half a billion dollars was under way or planned for completion within the next twelve months.

"On the basis of this sample, it is estimated that there will be close to a billion dollars worth of new privately financed factory construction in 1946, the highest rate to date.

FOOTNOTE: The Six-Point Plan announced by the Office of War Mobilization and Reconversion, simultaneously with the revocation of the Construction Order L-41, effective October 15, includes these steps:

1. Through inter-agency action an active campaign to increase the supply of scarce building materials is being undertaken, and where necessary, price and wage increases and priorities to break bottlenecks will be granted.
2. The War Production Board is strengthening inventory controls to prevent hoarding of building materials so that building will not be delayed by artificially created shortages.
3. The Office of Price Administration will strengthen price control over building materials to counteract inflationary pressure.
4. The Federal Credit Agencies will do everything possible to discourage excessive and unsound lending on mortgages. They will enlist voluntary cooperation of banks and other lending institutions to minimize the danger of inflated prices due to excessive demand.
5. Representatives of industry groups, including real estate, building supplies, and construction men, have been called to meet in Washington in December to map out a voluntary program to increase quickly the production of all materials and facilities needed for an expanded home-construction industry, and also to help fight inflated building costs and real estate prices.
6. The National Housing Agency, in conjunction with industry representatives will provide an information and advisory service on home values available to any prospective home buyer regardless of whether federal assistance in financing is involved.

MAXIMUM EFFICIENCY FOR STEAM HEATING SYSTEMS ON HEATING, DRYING AND PROCESS WORK.



JENNINGS CONDENSATION PUMPS

Designed for steam systems on heating, drying, or process work, these pumps offer the most reliable and efficient means of returning hot condensate to boiler or hot well. In many cases these pumps will save costly installation of boilers in a pit to provide gravity flow of returns from basement radiators and heating devices.

The Jennings Condensation Pumps are sturdy and compact in construction, and combine receiving tank, pump and driving motor in a single assembly. Pumps are bronze fitted throughout, with tobin bronze shaft. The pumping impeller is of special design, made possible by our wide experience with return line heating pumps, and is especially adapted for handling hot water with the greatest possible efficiency.

Full automatic control is furnished by means of a ball float and float switch mechanism mounted on the receiving tank. All wiring is made up at the factory, and it is necessary only to connect the pump to the system and hook up the leads. Complete information regarding these economical pumps sent promptly on request.

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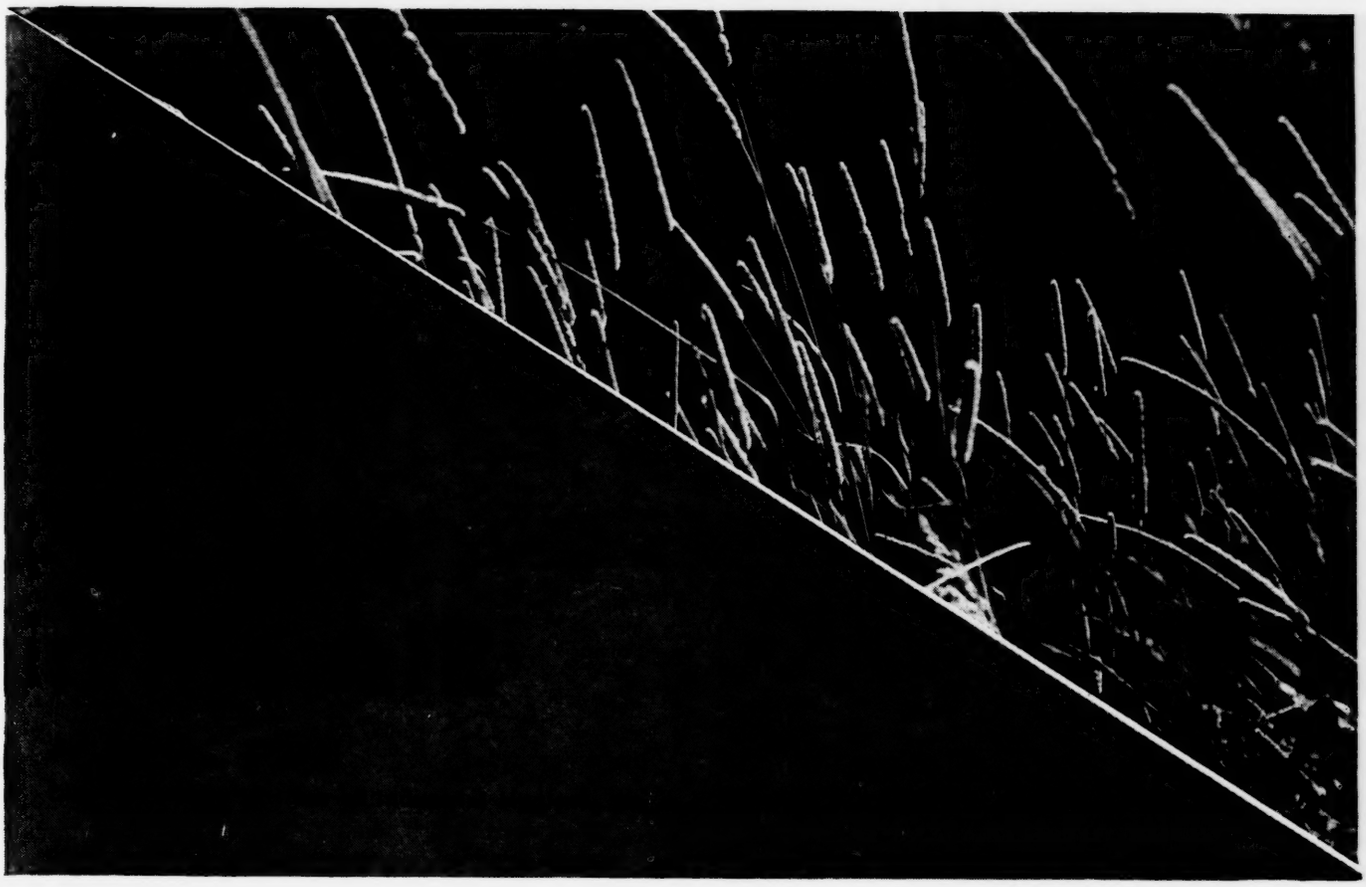


HAY fever is principally caused by the inhalation of atmospheric pollen from plants that have flowers, which lack fragrance, nectar, and bright colors and have small, poorly developed flowers. Plants of this type produce in great numbers small, light, dry pollen grains which are readily dispersed into the atmosphere by the shaking of the flower in a breeze. Great amounts of pollen are produced by these plants because propagation of the species depends upon the random contact of an air-borne pollen grain with the flower of a plant of similar species, perhaps several miles away. In the United States, ragweed is the outstanding example of a wind pollinating plant, the pollen from which causes hay fever.

Erdtman measured the number of pollen grains in some typical wind pollinated plants and found that in round numbers each flower of Norway spruce contained 1,800,000 pollen grains; each inflorescence of sycamore maple had 25,000,000 grains; and each branch system of Scotch pine 346,000,000 grains. The specific gravity of weed, tree, and grass pollen grains may be taken as 0.55, 0.9, and 1.0, respectively. Wind-borne pollen grains for the most part vary between 15 and 45 microns in diameter, the ragweeds being among the smallest. By virtue of their small diameter, low specific gravity, and the large numbers produced, it is small wonder that during pollination the atmosphere can become charged with millions of pollen grains. That wind can transport these pollen grains over long distances has been proven by finding pollen both in the air at mid-ocean and in the upper atmosphere. Ships or planes approaching shore and running into off-shore winds are known to pick up increasing concentrations of pollen as they approach land.

Contrary to popular belief, ragweed is not the only cause for hay fever although it is the most common. Pollen in the air comes from trees, grass, and other plants. The peak of pollination is different for each district and for each plant group. Methods of sampling and testing are important as a means of evaluating atmospheric conditions.

Pollen Seasons

Wind pollinated plants pollinate at different times in different climes. Ragweed is at its pollination peak about August 25 in the Dakotas, Wyoming, and Colorado; at about September 1 in the states east of the states mentioned and north of the Mason-Dixon line; about September 15 in most southern states, except along the Gulf where it is delayed till about October 1. Not only does the pollination peak occur at different dates in different zones but duration of pollination also varies from region to region. Again using ragweed as the example, there is evidence of a longer, as well as later, pollinating season in the south than in the north. In northern states ragweed starts pollination at around the first week of August and continues till mid-September, whereas in most of the south the pollination does not start till late August and continues till mid-October.

Plants other than ragweed exhibit different characteristic dates of pollination. In the vicinity of New York City, Fig. 1, the first of the tree pollens appear in the atmosphere in early March, reach a peak during the first week of May, and disappear,

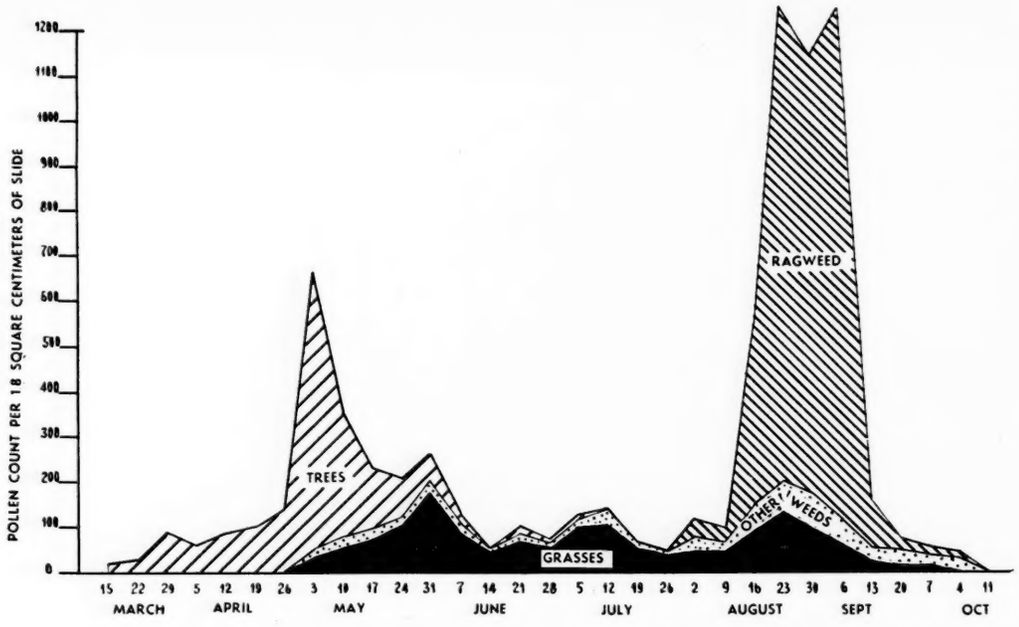


Fig. 1. Chart showing typical pollen count per week—Borough of Queens, New York City.

except for negligible traces, by the first week in June. Grass pollens first appear in mid-April, exhibit no very marked peak season, but persist at about the same concentration until late September or early October. In some localities, minor peaks of grass pollen concentration are noted.

Wind pollinated plants which flourish in some sections of the country are frequently absent from other parts. Thus the short and giant ragweeds are found only east of the Rockies; the southern ragweed in the area roughly bounded by the Tennessee and Mississippi Rivers; and the western ragweed only west from the Rockies to the coast except for a portion of western Washington and Orgeon. It will thus be seen that one or more of these four ragweed species grows in all parts of the United States, except for the section of western Washington and Oregon. However, growth is not necessarily equally profuse in all parts of the country. Differences in soil, rain, and climate tend to make growth luxuriant in some areas, sparse in others.

Pollen Measurement

Methods for measuring pollen content of air were first developed by Blackley, an English physician, who started routine air sampling in 1866. Publication of his work attracted sufficient interest in this country to cause atmospheric pollen studies to be made in 1875 in both New York City and Paterson, N. J. Thereafter, investigators lost interest in the matter until 1916 when Dr. William Scheppegrell started a series of daily atmospheric pollen measurements in New Orleans. He apparently was the only one in this country doing so until 1925 when others in various sections saw the need for obtaining similar information. Between 1925 and 1929 most investigators worked independently, but in the latter year, largely through the efforts of Oren C. Durham, uniform studies on a nation-wide basis were undertaken with the U. S. Weather Bureau co-operating. During the 10 years from 1925 to 1935 activity was sufficiently intensive to allow a comprehensive mapping of the U. S. with respect to concentrations of the various principal types of air-borne pollen. This mapping showed where each pollen type is found in the air, and also where it is not found. It should be noted that insofar as the distribution thus mapped depends primarily upon botanical distribution, it is likely to change but little for many decades to come.

In most sections of the land we therefore now know approximately when each of the principal pollens may be first expected to appear in the air, when it will reach a maximum, and when disappear. We also know the approximate size of these maxima. Dates and quantities are approximate, however, to the extent that there is a year to year variation depending upon weather, and within the pollinating season, a day to day variation depending upon wind. Most present atmospheric pollen samples are taken to keep track of these types of variations. Data thus obtained allow allergists to compare day to day hay fever symptoms with treatment and conversely, to adjust treatment to atmospheric pollen count.

Pollen Sampling

Almost all atmospheric pollen studies have used the gravity slide method of sampling. This consists of exposing to the atmosphere a glass microscope slide coated on the upper side with a thin film of a sticky jelly to which any pollen falling on the slide will adhere. It is customary to place the slide on a brick under a hood, Fig. 2, such as a 5-gallon tin can with both ends removed. This protects the slide from direct sun, rainfall, and the deposition of heavy cinder particles. Slides are usually exposed for 24 hours and then counted under the microscope at about 150 diameters magnification. The jelly used on the slides in recent studies has been a glycerine jelly containing basic fuchsin which serves to dye the pollen grains without dyeing the inorganic dust and cinder particles also caught on the slide. This greatly aids in rapid identification and counting of the pollen on the slide. Pollens are identified as to type of plant by comparison with either standard drawings, photographs, or slides. All three are made from pollen specimens obtained directly from plants. A sample of pollen thus obtained can be sprinkled on a reference slide, and from this slide photomicrographs (Fig. 3) or enlarged line drawings

(Fig. 4) made. Pollen samples for the preparation of reference slides are obtainable from most botanical supply houses. For purposes of species identification, a higher magnification than 150 diameters is sometimes used.

In order that pollen counts made by two different investigators be comparable, it is necessary for both to count the number of pollen grains on the same area of slide. In early studies there was very little uniformity in this regard, but in recent years it has been customary to either count 1.8 sq cm of slide, or to convert counts to the equivalent count for 1.8 sq cm. This odd area arose because in the early years of pollen sampling it simplified the use of the then accepted formula for converting ragweed gravity slide counts to the equivalent volumetric pollen concentration per cu yd of air.

Gravity to volumetric conversion formulas are in the general form:

$$n = \frac{K\ N}{D^2}$$

Where n is pollen per cu yd of air

N is gravity slide count per sq cm of slide per 24 hours

D is pollen diameter in microns (18 for ragweed)

K is a constant depending upon particle specific gravity, and particle shape (4200 for ragweed).

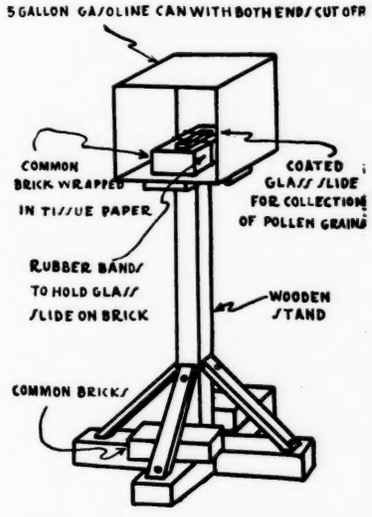

5 GALLON GASOLINE CAN WITH BOTH ENDS CUT OFF
COMMON BRICK WRAPPED IN TISSUE PAPER
COATED GLASS SLIDE FOR COLLECTION OF POLLEN GRAINS
RUBBER BAND TO HOLD GLASS SLIDE ON BRICK
WOODEN STAND
COMMON BRICKS

Fig. 2. Gauge for gravity slide collection of pollen.

In the formula originally used the value of *K* differed from that in current favor. As a result, volumetric data computed from gravity slide counts on the basis of the original conversion formula is not the same as would be computed from those now used. Because of this and the need for different conversion constants for each type of pollen, present feeling is that it is best to leave gravity slide counts "as is", without applying any conversion formula.

Volumetric and Gravimetric Samples

Some investigators have measured volumetric data directly without recourse to conversion formulae. In one recent ingenious device a 0.20mm slit is moved by an electric clock at 2.5mm per hour above a coated slide inside a box kept under a suction sufficient to aspirate 0.1 cfm of air through the slit and cause it to impinge on the slide. Other volumetric methods suggested are air filtration, and air aspiration through labyrinths of plates coated with adhesive jelly. No large scale studies have as yet been made using any of these volumetric methods even though such data can tell directly how much pollen is in the air and is breathed.

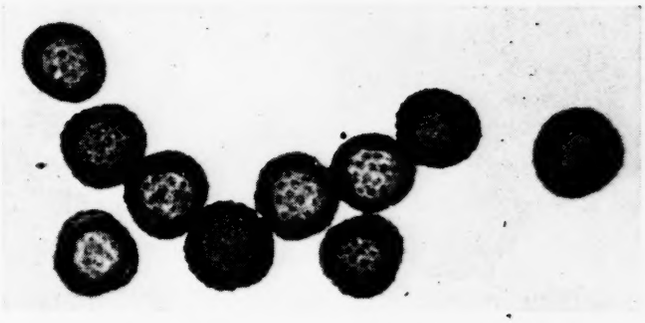


Fig. 3. Common ragweed pollen — magnification 690. Courtesy, Herman Felton, U. S. Public Health Service.

Some experts feel that gravimetric is the ideal basis for measuring and reporting pollen. They reason that the effectiveness of pollen as a sensitizing

TABLE 1. — ATMOSPHERIC RAGWEED POLLEN SCORING OF 94 NORTH AMERICAN CITIES.

(See text for explanation of scoring computation*. The higher the score the greater the ragweed pollen incidence.)

City	Score	City	Score
Indianapolis, Ind.	124	Toronto, Ont.	23
Peoria, Ill.	113	Alpena, Mich.	21
Buffalo, N. Y.	100	Marquette, Mich.	21
Toledo, O.	96	Nantucket, Mass.	20
St. Louis, Mo.	93	North Platte, Neb.	16
Springfield, Ill.	89	Boston, Mass.	15
Omaha, Neb.	87	Montreal, Que.	15
Kansas City, Mo.	85	Pierre, S. D.	14
Louisville, Ky.	84	St. Ignace, Mich.	13
Iowa City, Ia.	83	Petosky, Mich.	13
Flint, Mich.	83	Eagle River, Wis.	13
Minneapolis, Minn.	80	Charleston, S. C.	11
Milwaukee, Wis.	78	Ottawa, Ont.	11
Dallas, Tex.	75	Mobridge, S. D.	10
Chicago, Ill.	74	Winnipeg, Man.	8
Wichita, Kans.	73	Parry Sound, Ont.	8
Hatteras, N. C.	71	Tampa, Fla.	8
Cleveland, O.	68	Mobile, Ala.	8
Houston, Tex.	68	Port Arthur, Ont.	7
Detroit, Mich.	67	Lake Placid, N. Y.	7
Rochester, Minn.	67	Biloxi, Miss.	7
Oklahoma City, Okla.	66	Tower, Minn.	6
Frankfort, Mich.	63	Sault Ste. Marie, Mich.	6
Lincoln, Neb.	63	Eastport, Me.	6
Memphis, Tenn.	63	Saranac Lake, N. Y.	5
Moorehead, Minn.	61	Bethlehem, N. H.	5
Asheville, N. C.	58	Boise, Idaho	5
Pittsburgh, Pa.	57	Tampico, Mex.	4
Knoxville, Tenn.	49	Miles City, Mont.	4
Duluth, Minn.	44	Salt Lake City, Utah	3
Philadelphia, Pa.	41	Cochrane, Ont.	2
Washington, D. C.	40	Isle Royal, Mich.	2
Atlanta, Ga.	39	Rangely Lakes, Me.	2
Little Rock, Ark.	38	Father Point, Que.	1
Galveston, Tex.	36	El Paso, Tex.	1
New Orleans, La.	34	Amarillo, Tex.	1
Vicksburg, Miss.	33	Jacksonville, Fla.	1
Block Island, R. I.	31	Los Angeles, Cal.	1
Atlantic City, N. J.	30	Phoenix, Ariz.	1
New York City, N. Y.	30	Prince Albert, Sas.	0
Denver, Colo.	29	Mexico, Mex.	0
Raleigh, N. C.	28	Miami, Fla.	0
Richmond, Va.	28	Sacramento, Cal.	0
San Antonio, Tex.	27	Reno, Nev.	0
Brownsville, Tex.	24	Spokane, Wash.	0
Coney Island, N. Y.	23	Seattle, Wash.	0
Lander, Wyo.	23	Portland, Ore.	0

*Durham, O. C., Evaluation of the Ragweed Hay Fever Resort Areas of North America, Journal of Allergy, Vol. 8, p. 175-180, 1936.

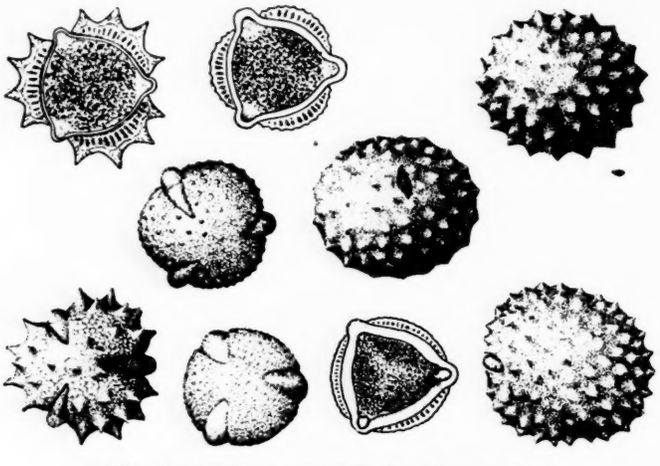


Fig. 4. Various magnified pollen grains.

Courtesy, McGraw-Hill Book Co. From *Pollen Grains, their Structure, Identification and Significance in Science and Medicine*, by R. P. Wodehouse.

agent is proportional to the mass of pollen substance inhaled rather than merely to the number of pollen grains, some of which may be of low unit mass. Measurement of the mass of all pollen in the air, undifferentiated as to type of plant, is almost impossible because of the need for excluding from measurement other air-borne solids. Gravimetric measurements which differentiate the various pollen types would, of course, be still more difficult. Gravimetric data computed from gravity counts are open to the same criticism as volumetric data so derived.

Hay Fever

The average person can breathe air containing suspended pollen with no adverse reaction. However, many persons find that after they have inhaled air containing enough of certain specific species of pollen they experience the reactions we commonly know as hay fever. About 20 ragweed pollen grains must be inhaled to produce a reaction in a sensitized individual. During the peak six weeks of the ragweed season in New York (Fig. 1) daily ragweed gravity counts of 25 or more per 1.8 sq cm (weekly counts of 175 or more) are commonplace. Volumetric conversion calculations show that a 1.8 sq cm slide count of 25 (13.9 per 1 sq cm) is roughly equivalent to 180 ragweed pollen per cubic yard of air. Since any person of average activity will inhale about 20 cu yd of air per day, it is apparent that a hay fever sufferer will inhale at least 3,600 ragweed pollen grains per day. During the three worst weeks, when weekly ragweed counts exceed 700, daily inhalation of about 15,000 pollen may be anticipated.

Some people are sensitive to many, others to but few, species of pollen. The months during which symptoms occur establish, in a general way, the pollen group causing the trouble. Thus in the United States, spring hay fevers are generally due to tree pollen, early summer hay fevers to grass pollen, and late summer hay fevers to the weeds. In terms of total pollen count per season, usually only from 10 to 20% are grass pollen, the rest being fairly evenly divided between tree and weed pollen. However, there are very few persons sensitive to tree pollen; a large group are sensitive to weeds other than ragweed; a still larger group to the grasses; and the largest group of all to the ragweeds. Therefore, spring hay fevers are relatively unimportant because of the small number of individuals sensitive to tree pollen; and early summer hay fevers are of secondary importance because of the comparatively small number of grass pollen in the air.

Rating of Communities as to Ragweed Incidence

Since ragweed is by far the most common weed pollen, it is understandable that over 60% of all hay fever and over 80% of all late summer hay fever are attributed to ragweed. Because of this, the rating of communities as potential havens from hay fever is based upon ragweed rather than total pollen count. Durham devised an index to rate communities on this basis. He charges one point for each day in the year during which the daily ragweed count exceeds 25 pollen per 1.8 sq cm of slide, one point for each 100 ragweed pollen in the maximum daily ragweed count in the year, and one point for each 200 ragweed pollen in the year's total ragweed pollen count. As an example, the city having the highest published score (Table 1) was Indianapolis with 37 "hay fever days" (score 37); 2130 ragweed pollen on the worst day (score 21.3); and 13,073 ragweed pollen per average year (score 65.3) to make a total score of 124. To qualify as a hay fever resort, the score must be down around 10 or lower.

Pollen Control

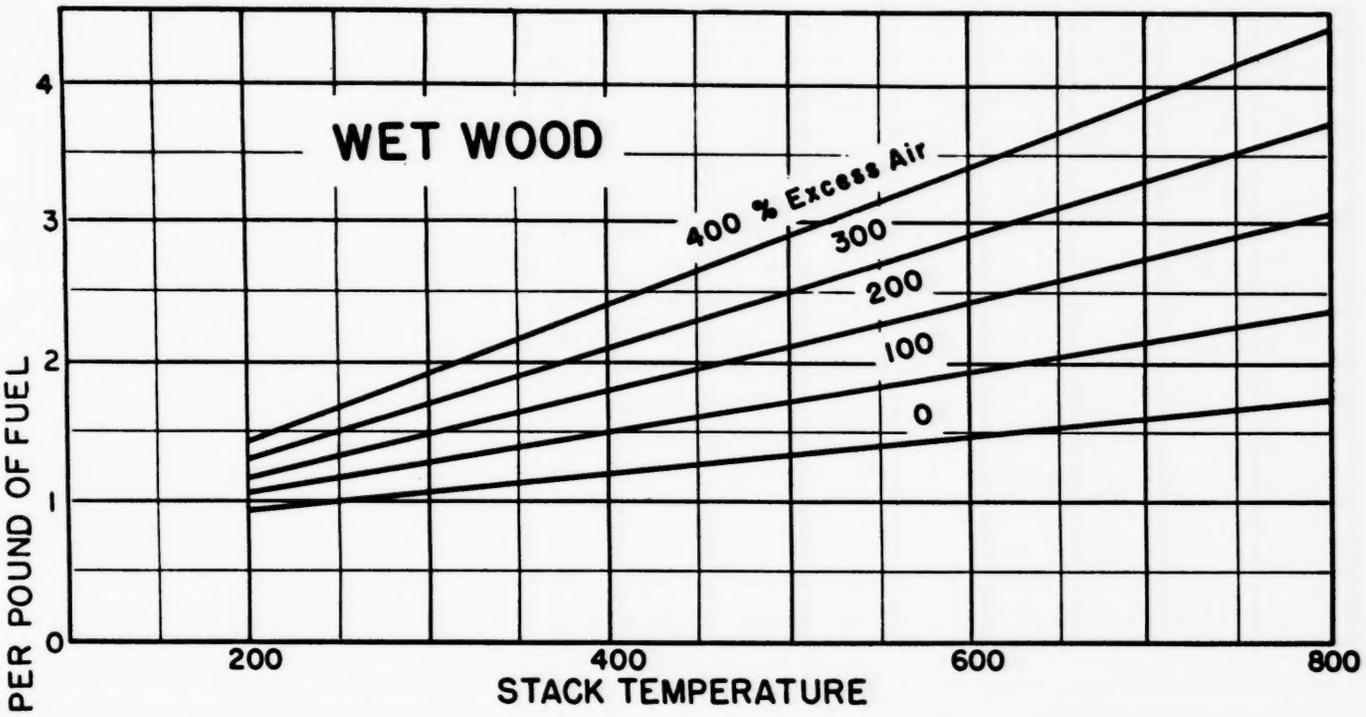
The hay fever sufferer can obtain permanent relief either by moving to a city of low potential hay fever score or by lowering the score of his present city through weed eradication. For temporary relief, there are medical means, i.e., immunization through injection of pollen extracts, and mechanical means, removal of pollen from the air prior to breathing it. Pollen removal from air involves either respiratory protection of the susceptible individual or air filtration of the room he occupies. Most of the proprietary personal filters sold to hay fever victims are inobtrusive little gadgets that are concealed in the nostrils and, by virtue of their minute size, possess none of the attributes we associate with a properly designed respirator.

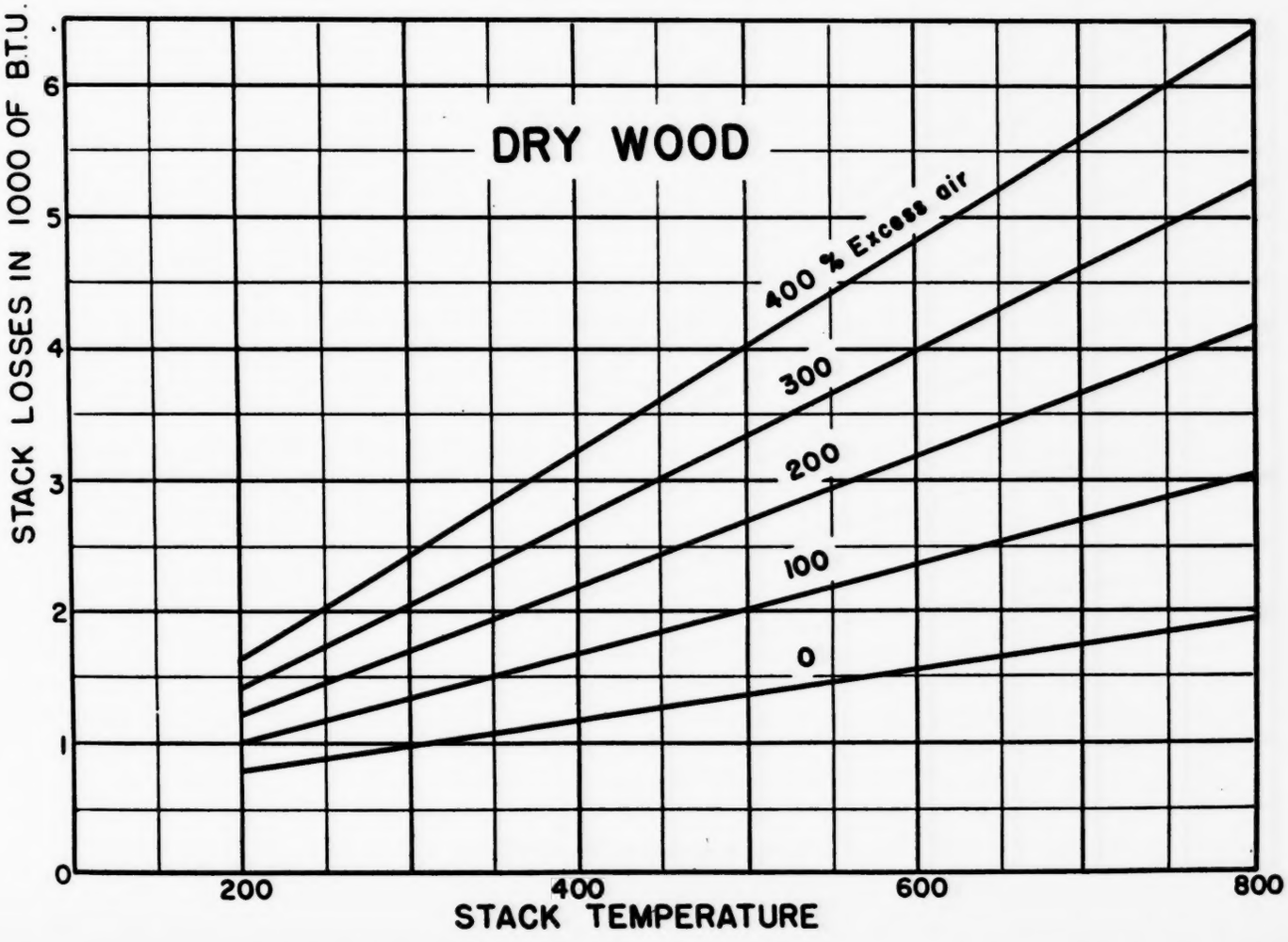
Room air filtration, on the other hand, will obviously protect a person only while he remains within a filtered enclosure. Therefore protection is possible by this means only for persons who can spend all or most of their time during the worst hay fever days in filtered enclosures in home, office, hospital, or theatre; and is impossible for persons who spend a large part of their time away from such shelters. In general, respirators, air filters, or washers effective against dust will also protect against pollen. Not long after the first efficient air filters and air washers went into ventilating systems, hay fever sufferers learned of the relief afforded them by staying in rooms whose incoming air was substantially pollen free. Each year since then appreciable numbers of air cleaning installations have been made for the primary purpose of relieving individuals of hay fever or asthmatic attacks.

Stack Losses from Wood Fuel

The accompanying charts, designed by Earl C. Willey, professor of mechanical engineering, Oregon State College, show the stack losses in Btu per pound of fuel for both wet and dry wood with various percentages of excess air. They have been used in gas analyzer demonstrations.

The charts apply specifically to fir with a heat content of 8750 Btu per lb, dry.





Design of Exhaust Systems

— and calculations of their pressure losses

JOHN M. KANE

Chief Engineer, Dust Control Division,
American Air Filter Co.,
Louisville, Ky.

In this article, the essentials of exhaust system design are boiled down to include all and only those considerations required in the design of the average exhaust installations.

WHILE the design of exhaust systems for industrial dust control and the factors involved in the calculation of pressure losses within such systems can be discussed in great detail, such involved consideration is not required for the average installation.

An exhaust system consists of hoods enclosing the source of dust generation, branch ducts connected to the hoods, one or more main ducts joining the branches, a dust collector to remove the dust exhausted, and an exhauster to produce the necessary air flow through hoods and to overcome the resistance to air flow of the system.

Hood design is based primarily on the degree to which the dust source can be enclosed. The number of square feet of opening through which an indraft of air must be maintained, and a selection of the necessary indraft velocity to prevent escapement will determine the cubic feet of air to be exhausted for each operation. The accompanying tables will serve as a guide for many applications.

Size of branch and main ducts are readily calculated by selecting the velocity necessary to convey the material. The air volume in cfm divided by the required velocity in feet per minute gives the necessary cross section of the duct section under study.

The exhauster must be of sufficient size to exhaust the volume of air with reasonable horsepower. Its speed will be a function of the pressure losses to be overcome in the system. With air volume and pressure known, exhauster tables indicate the exhauster speed and motor horsepower required. An error of 10% in pressure loss calculations will cause a variation of approximately 5% from calculated exhaust volumes. Factors of safety in exhaust requirements and conveying velocities are ample to permit much greater variation without noticeable change in the effectiveness of the exhaust system.

The following method will greatly simplify the procedure and assumes:

1. Required exhaust volume from each hood or enclosure is known or has been determined.
2. Pressure loss calculation within 10% of exact value is sufficiently close for practical purposes.
3. Blast gates can be used to equalize pressure losses in the various branches.

There are two basic variations in method of pressure loss calculations. As many exhauster tables are based on static pressure across the fan, the entrance loss at the hood is used instead of the hood suction (entrance loss plus velocity pressure in the connecting branch) as the loss through the hood. The method illustrated in this discussion uses the hood suction as the loss through the hood. It has a number of advantages including:

1. Branch velocities are often higher than the velocity at the exhauster inlet. Inclusion of the higher velocity pressure counter-balances small

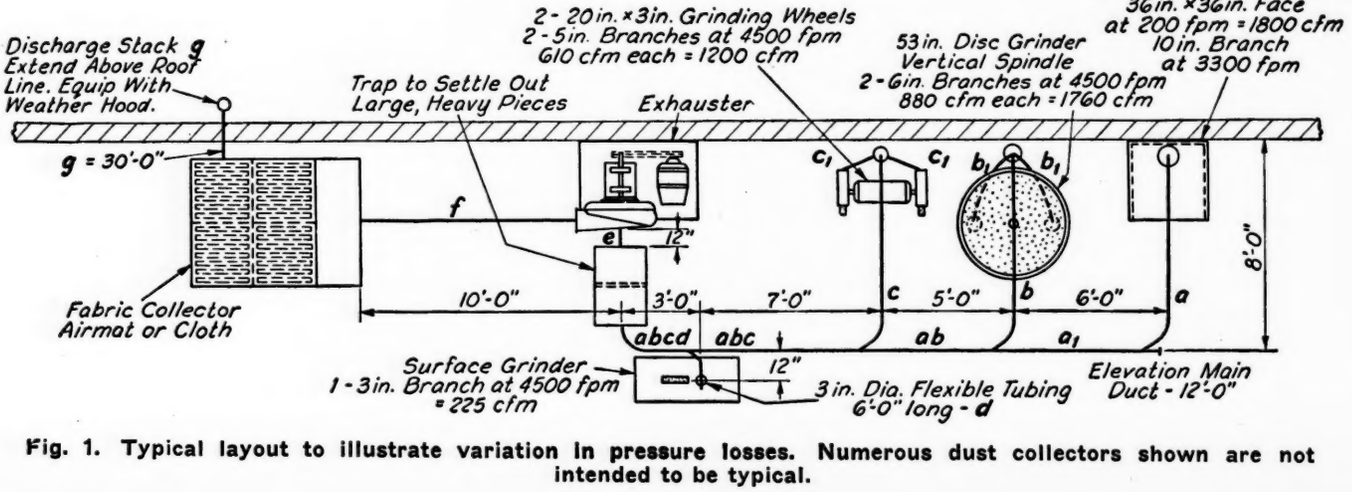


Fig. 1. Typical layout to illustrate variation in pressure losses. Numerous dust collectors shown are not intended to be typical.

acceleration and deceleration losses in the system and produces a result on the safe side.

2. By starting with the hood suction, pressures in the system can be immediately checked with a manometer against the calculated values in the system design.

Design Problem

For such installations, the data included in the following tables normally will be sufficient. Their application can best be discussed by means of a practical example such as the following:

EQUIPMENT TO BE EXHAUSTED

A. One metallizer spray booth with face opening 36 in. x 36 in.
B. One 53 in. vertical spindle disc grinder.
C. One 2-wheel grinding stand 20 in. x 3 in. wheels.
D. One surface grinder maximum 6 in. wheel.

BRANCH PIPE SIZES AND REQUIRED EXHAUST VOLUMES

Branch pipe sizes and cfm exhausted from many operations are specified by:

1. State codes or regulations.
2. Professional society codes of recommended practice.
3. Necessary inward velocities through hood openings to prevent dust escapement. General range of indraft velocities and conveying velocities are tabulated in Table 9. It will serve as a guide where recommendations for specific applications are not available. Branch size is readily determined to the nearest practical diameter by determining the total volume from hood and selecting the suitable conveying velocity. Standard duct diameters vary with the fabricator, but generally increase through 5½ inch diameter in ½ in. steps; 6 in. through 16 in. in 1 in. steps; above 16 in. in 2 inch steps.

TABLE 1.—VELOCITY PRESSURE

IN. OF WATER	FPM	IN. OF WATER	FPM
.10	1266	1.60	5065
.15	1550	1.70	5225
.20	1791	1.80	5380
.25	2003	1.90	5522
.30	2193	2.00	5664
.35	2373	2.20	5940
.40	2533	2.40	6210
.45	2688	2.50	6340
.50	2832	2.60	6460
.55	2973	2.80	6700
.60	3102	3.00	6937
.65	3230	3.20	7170
.70	3351	3.40	7390
.75	3468	3.50	7500
.80	3582	3.60	7610
.85	3692	3.80	7810
.90	3800	4.00	8010
.95	3905	4.20	8210
1.00	4005	4.40	8400
1.10	4208	4.50	8490
1.20	4390	4.60	8590
1.30	4566	4.80	8770
1.40	4735	5.00	8950
1.50	4905		

TABLE 2
Temperature—Density

TEMP. F	DENSITY FACTOR	WT PER CU FT
0	1.152	.0864
70	1.000	.0749
100	.946	.0709
150	.869	.0651
200	.803	.0602
250	.747	.0560
300	.697	.0522
350	.654	.0490
400	.616	.0462
450	.582	.0436
500	.552	.0414
550	.525	.0393
600	.500	.0375
650	.477	.0358
700	.457	.0342
750	.438	.0328
800	.421	.0315
850	.404	.0303
900	.390	.0292
950	.376	.0282
1000	.363	.0272

TABLE 3
Altitude—Density

ELEV. IN FT	DENSITY FACTOR	WT PER CU FT
0	1.000	.0749
500	.981	.0735
1000	.962	.0721
1500	.944	.0707
2000	.926	.0694
2500	.909	.0681
3000	.891	.0668
3500	.874	.0655
4000	.858	.0643
4500	.842	.0631
5000	.826	.0619
5500	.810	.0607
6000	.795	.0596
6500	.780	.0585
7000	.766	.0574
7500	.751	.0563
8000	.737	.0552
8500	.723	.0542
9000	.710	.0532
9500	.697	.0522
10000	.685	.0514

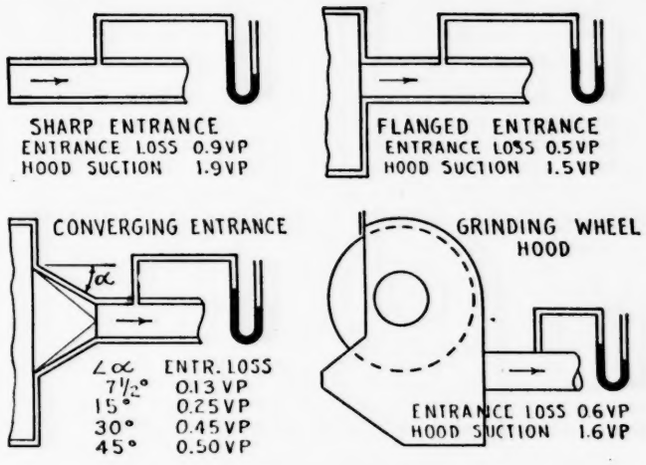


Fig. 2. Various types of entrance losses.

Usual exhaust volumes for somewhat standardized applications are listed in Tables 8, 10, 11, and 12. Branch and main velocities are indicated by Tables 7 and 8. Actual velocities will vary as much as 10% from design value to utilize usual duct diameters for a specified exhaust volume. Conveying velocities listed include a high factor of safety when compared to critical velocities where settling of material in ducts occurs.

The branch size and exhaust volume from the equipment listed above could therefore be:

A. 3 ft x 3 ft x 200 fpm indraft	1800 cfm*
B. 2—6 in. Branches at 4500 fpm	1760 cfm
C. 2—5 in. Branches at 4500 fpm	1220 cfm
D. 1—3 in. Branch at 4500 fpm	225 cfm
Total exhaust volume =	5005 cfm

System Layout

A single line diagram is most helpful in calculating the pressure loss of the system. Location of equipment will be determined by plant layout. The various branches should be connected by a main duct located to give as short a run to the dust collector as possible. Where possible, branches having the greatest resistance should be of the shortest possible lengths and should enter the main as close to the collector as possible. Frequently sufficient latitude in dust collector location is available to allow system design for minimum resistance and consequently slightly lower horsepower consumption. In other cases, the exhauster and collector will be located where space is available and where disposal of the collected material is most convenient. These consid-

*Use 10 in. branch at 3300 fpm. In actual practice a 9 in. branch with 4070 fpm could be used for booth *A*, although 3300 fpm would be ample to convey the material. The higher velocity tends to equalize the branch resistance as the remaining branches in the system are smaller and have high conveying velocities. With the 10 in. branch specified, it will be necessary to close the blast gate farther in that branch to prevent pulling more than specified air volume at the expense of the remaining equipment whose branches offer greater resistance to the air flow.

TABLE 4.—AIR VOLUME HANDLED THROUGH BRANCH PIPES

Diameter of Pipe, In.	Velocity in Pipe in FPM								
	2000	2500	3000	3500	4000	4500	5000	5500	6000
	Volume in CFM								
1½	25	31	37	43	49	55	62	68	74
2	44	54	65	76	87	98	109	120	131
2½	68	85	103	120	137	154	171	188	205
3	98	123	147	172	197	221	246	270	295
3½	134	167	200	234	267	300	334	367	400
4	175	218	262	306	350	393	437	480	524
4½	221	276	331	387	442	497	552	608	663
5	273	341	409	478	546	614	682	750	818
5½	330	413	495	578	660	742	825	908	990
6	393	491	589	688	786	884	982	1080	1178
7	534	668	802	936	1070	1204	1338	1472	1605
8	699	874	1048	1220	1396	1571	1745	1920	2095
9	882	1105	1325	1546	1766	1988	2210	2430	2650
10	1092	1364	1637	1910	2182	2456	2730	3000	3273

TABLE 5.—SUCTION FOR VARIOUS ENTRANCE LOSSES
(Suction Equals 1 VP + Entrance Loss)

Entr. Loss in VP	Velocity in Pipe in FPM								
	2000	2500	3000	3500	4000	4500	5000	5500	6000
	Suction in In. of Water								
0.2	0.30	0.47	0.67	0.92	1.20	1.52	1.87	2.27	2.70
0.4	0.35	0.55	0.79	1.08	1.40	1.77	2.18	2.64	3.15
0.6	0.40	0.62	0.90	1.22	1.60	2.02	2.50	3.02	3.60
0.8	0.45	0.70	1.01	1.39	1.80	2.28	2.81	3.40	4.05
1.0	0.50	0.78	1.12	1.54	2.00	2.53	3.12	3.78	4.50
2.0	0.75	1.17	1.68	2.31	3.00	3.80	4.68	5.67	6.75

TABLE 6.—EQUIVALENT RESISTANCE OF ELBOWS AND BRANCH ENTRIES
(In Feet of Straight Pipe)

Dia. of Pipe, In.	90 Deg. Elbow Inside Radius			Angle of Entry, Deg.	
	1 D	1½ D	2 D	30	45
3	5	4	3	2	3
4	7	5	4	3	5
5	9	6	5	4	6
6	11	7	6	5	7
7	13	9	7	6	9
8	14	10	8	7	11
10	20	13	11	9	14
12	25	17	14	11	17
14	30	21	17	13	21
16	36	24	20	16	25
18	41	28	23	18	28
20	46	32	26	20	32
24	57	38	32		
30	75	51	42		
36	87	60	49		

For 60° El.....× .75
For 45° El.....× .50

erations often outweigh the slight savings in power of a better balanced system.

Typical layout for the equipment in the above example has been indicated in Fig. 1. Procedure followed is tabulated in Table 9, using the basic engineering data of Tables 1 to 7 and Fig. 3.

From this procedure all essential exhaust system information has been obtained including:

1. Exhaust volume and pressure loss which determines exhauster size, speed and horsepower.
2. Branch and main ducts of exhaust system have been sized. These data are sufficient for the sheet metal contractor to install the required system, following accepted construction specifications. Typical specifications have been included in the closing section of this article.

Corrections for High Temperatures and Elevations

After installation of the system, the exhaust volumes should be adjusted by the blast gates to obtain required distribution. Blast gates should then be locked in place to prevent tampering. Periodic inspection should follow to assure continued effectiveness of the installation.

Exhauster performance tables, exhaust volume requirements, and resistance charts assume standard atmospheric conditions of temperature and barometric pressure. These assumptions fix the air density at .07488 lb per cu ft (70F dry air at 29.92 in. Hg barometric pressure). Where appreciable variation occurs, the change in air density must be considered. It is helpful to remember that a centrifugal exhauster connected to a given system will exhaust the same *volume* regardless of air density. The pounds of air moved, however, will be a function of the density, as will the pressure developed and horsepower consumed.

Assume an exhauster connected to a given system and capable of moving 10,000 cfm of air at standard conditions through that system. If the air entering the exhaust hoods was subsequently heated to 600F before entering the exhauster, the volume exhausted would be 10,000 cfm at 600F. The volume at this temperature would contract to 5000 cfm at 70F, reducing the inflow of air to the hoods to 50% of the original volume.

In like manner, move the exhaust system handling standard air from sea level to an elevation 5500 ft above sea level. The exhauster would still

TABLE 7.—INDRAFT VELOCITIES FOR HOODS AND CONVEYING VELOCITIES IN DUCTS

Indraft Velocities

Air velocities recommended through openings in hoods enclosing operation or over zone of dust generation.

Method of Generation	Usual FPM	Typical Processes
Released without noticeable movement	50-100	Evaporation of vapors; exhaust from pickling, washing, de-greasing, plating, welding.
Released with low velocity	100-200	Paint spraying in booth; inspection, sorting, weighing, packaging; low speed conveyor transfer points; rotating mixtures; barrel filling.
Active generation	200-500	Foundry shakeout; high speed conveyor transfer points; crushers, screens.
Released with great force	500-2000 and higher	Grinding; tumbling mills; abrasive cleaning; metal working.

Conveying Velocities

Material Conveyed	Conveying Velocity in Ducts—Fpm
Vapors, gases, fumes, very fine dusts	1500-2000
Fine dry dusts	3000
Average industrial dusts	3500
Coarse particles	3500-4500
Large particles, heavy loads, moist materials, pneumatic conveying	4500 and higher

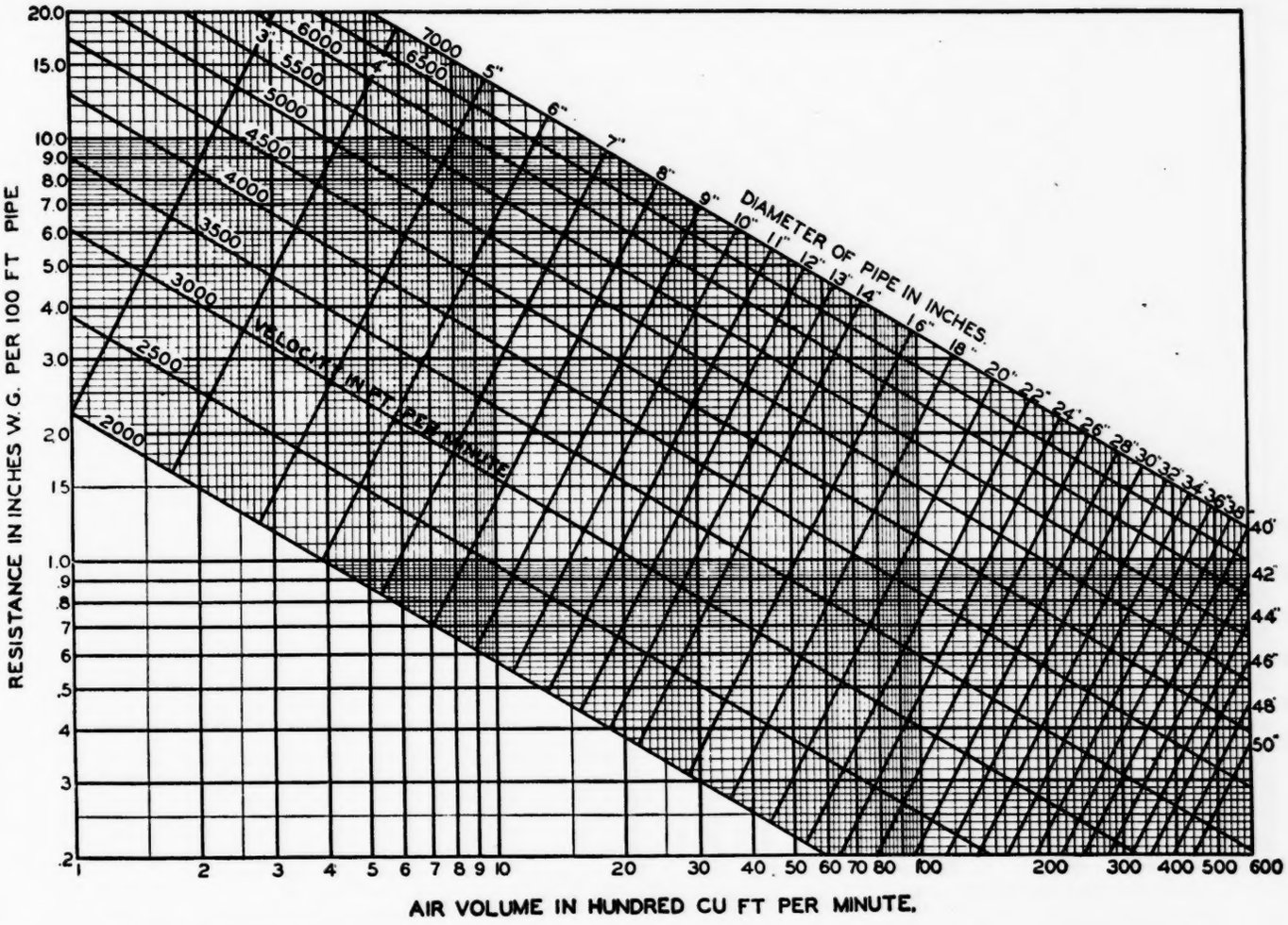

RESISTANCE IN INCHES W.G. PER 100 FT PIPE
VELOCITY IN FT. PER MINUTE
DIAMETER OF PIPE IN INCHES
AIR VOLUME IN HUNDRED CU FT PER MINUTE.

Fig. 3. Pipe resistance chart. (Copyrighted 1937 by American Air Filter Co., Inc., Louisville, Ky.)

handle 10,000 cfm but the pounds of air would be reduced to 81% of the weight of standard air.

Where high temperatures or elevations are encountered, corrections from standard air data can be made as follows:

Increase exhaust volumes by reciprocal of density factor to keep the same pounds of air as those for standard conditions moving into the hood to prevent dust escaping. Size branch and main ducts, calculate pressure losses, and select exhauster as if corrected volumes were for standard air. This procedure will arrive at the correct size exhauster and rpm. Horsepower and pressure losses throughout the system will decrease directly as the density factor. Such factors for increased temperatures are listed in Table 2; for increased elevations in Table 3. As noted in Table 9, Note 7, variations for temperatures under 100F or elevations under 1500 feet are seldom required with the permissible variations allowed for in usual exhaust system design.

Air Supply

Air discharged from dust collectors may be clean enough to return to the work room if the material is non-toxic. In most cases, however, the air is dis-

TABLE 8.—USUAL EXHAUST VOLUMES AND CONVEYING VELOCITIES FOR DUST PRODUCING EQUIPMENT

Dust Producing Equipment	Exhaust Hood	Exhaust Requirements	Conveying Velocities in Fpm Branch	Main	Reference and Notes
Abrasive blast rooms (sand, grit or shot)	Tight enclosure with air inlets (usually in roof	60-100 fpm downdraft (long rooms of tunnel proportions 100 fpm cross-draft)	3500	3500	Exhaust volume should be sufficient to provide visibility for operator. Sand as abrasive or castings with cores or heavy molding sand deposits require highest range. AFA, N. Y. and Illinois specify 80 fpm downdraft minimum for all cases
Abrasive blast cabinets	Tight enclosure with access openings	20 air changes per minute but not less than 500 fpm through all openings	3500	3500	AFA Code
Bagging machines	Booth or enclosure (provide spillage hopper)	Paper bags—100 cfm per sq ft open area Cloth bags—200 cfm per sq ft open area	3500	3500	New York Code 34 for silica dust in stone crushing operations
Barrels (for filling or removing material	Local hood 120 deg. around top of barrel	Through 24 in. dia.—4 in. branch Over 24 in. dia.—5 in. branch	3500	3500	

(Continued next page)

TABLE 8 (CONT.)—USUAL EXHAUST VOLUMES AND CONVEYING VELOCITIES FOR DUST PRODUCING EQUIPMENT

DUST PRODUCING EQUIPMENT	EXHAUST HOOD	EXHAUST REQUIREMENTS	CONVEYING VELOCITIES IN FPM BRANCH	MAIN	REFERENCE AND NOTES
Belt conveyors	Hoods at transfer point	Belt speeds less than 200 fpm—350 cfm per foot of belt width, but not less than 150 fpm through open area. Belt speeds over 200 fpm—500 cfm per foot of belt width but not less than 200 fpm through open area	3500	3500	New York Code 10 and 34. Illinois Code specifies 300 cfm per foot of belt width. Foundry dust control, "The Foundry", January 1938.
Belt wipers (may be required with high speed belts)	Tight fitting hood held against under side of belt	200 cfm per foot of belt width	3500	3500	Requires high hood suction and high conveying velocities. Mechanical brushing or wiping often used in conjunction with hood.
Bins (closed bin top)	Connect to bin top away from feed point	150-200 fpm through open area at feed points, but not less than 0.5 cfm per cu ft of bin capacity	3500	3500	
Bucket elevators	Tight casing required	100 cfm per sq ft of elevator casing cross-section. (Exhaust from elevator head)	3500	3500	To maintain indraft in casing only. Additional exhaust at elevator boot and discharge unless tight connections are employed.
Ceramics					
Dry Pan	Local Hoods	See Mixers	3500	3500	
Dry Press		Automatic feed, 1-5 in. dia. branch at die	3000	3000	
		Manual feed, 1-5 in. dia. branch at supply bin; 1-5 in. dia. branch at die			
Fettling, brushing, sagger filling and unloading	Downdraft or side hood	100-150 cfm per sq ft of plan area of dust producing operation	3500	3500	
Grinders Polishing, buffing, etc.	Standard wheel hood	See Table 10	4500	3500	AFA, New York and Illinois Codes
Grinders swing frame	Booth	100-150 fpm indraft through opening in booth face	3000	3000	Swing Frame Grinder Dust Control, "The Foundry", August, 1944.
Grinders Portable and flexible shaft	Downdraft grilles. Use side shields where possible	Bench type, 200-400 cfm per sq ft of exhaust grille but not less than 150 cfm per sq ft of plan working area	3500	3500	New York Code says not less than 100 cfm per sq ft of gross working area
		Floor grille, 200-400 cfm per sq ft of exhaust grille but not less than 100 cfm per sq ft of plan working area	3500	3500	
Tumbling Mills					
Hollow trunnion type	Exhaust connection by manufacturer	Use branch diameter same size as exhaust outlet. For round mills branch diam. should be 1/6 dia. of mill; for square mills, branch diam. should be 1 in. plus 1/6 side dimension of mill	4000 5000	3500 4000	AFA, New York and Illinois Codes specify 5000 fpm in branches
Stave type	Enclosure	See Table 11	3500	3500	New York Code 10
Mixer	Enclosure	100-200 fpm through working and inspection openings	3500	3500	Where mixer causes pronounced agitation, use indraft velocities in the higher range listed
Pharmaceuticals Coating pans	Narrow side hood	Through 16 in. opening—200 cfm Over 16 in. through 22 in. 300 cfm Over 22 in. through 26 in.—400 cfm	3000	3000	Assumes no heated air supplied to coating pan. Increase exhaust volume by cfm of heated air where supplied
Shakeouts Foundry	Enclosure	200 fpm through all openings in enclosure, but not less than 200 cfm per sq ft of grate area	3500	3500	New York and Illinois Codes
	Side Hood (use side shields whenever possible)	400-600 cfm per sq ft of shakeout grate area			New York and Illinois Codes use minimum of 275 cfm per sq ft of grate area where two sides are shielded and hood extends over not less than 1/3 of grate area
Screens Vibrating, Flat deck	Enclosure	150-200 fpm indraft through hood openings, but not less than 25-50 cfm per sq ft of screen area	3500	3500	Use single deck area where screen has two or more decks
Cylindrical	Enclosure	100 cfm per sq ft of circular cross-section but not less than 400 fpm indraft through openings in enclosure	3500	3500	
Woodworking		See Table 12	4000	3500	
Miscellaneous Packaging machines, granulators, enclosed dust producing units	Complete enclosure	100-400 fpm indraft through inspection or working openings, but not less than 25 cfm per sq ft of enclosed plan area	3000	3000	Volume will normally be insufficient to prevent dust settling on floor and equipment within enclosure
Packaging, weighing, container filling, inspection	Booth	50-150 cfm per sq ft of open face area	3000	3000	
	Downdraft	75-150 cfm per sq ft of dust producing plan area	3500	3500	

TABLE 9.—CALCULATION OF EXHAUST SYSTEM

1	2	3	4	5	6 From Tables 7 & 8	7	8	9 From Table 7	10	11 From Fig. 3	12	13 From Table 1	14 From Table 2	15 From Table 5	16	17
			Air Vol. Cfm			Length of Pipe in Feet				Resistance in Inches of Water						
No. of Br. or Main	Dia. Pipe in In.	Area Pipe, Sq Ft	in Branch	in Main	Vel. in Fpm	Straight Runs	No. of Elbs.	Equiv. Elbs.	Total Length	Per 100 Ft.	Of Run	One Vp	Orifice Loss	Hood Suction	Total Res.	Gov. Res.
a	10	0.545	1800		3300	15	2	26	41	1.4	0.57	.68	.45vp	0.99	1.56	
a_1	10	0.545		1800	3300	6	0	0	6	1.4	0.08				.08	
b_1	6	0.196	880		4500	6	3	21	27	4.8	1.30	1.25	.60vp	2.00	3.30	3.30
b	9	0.442		1760	4000	16	2	24	40	2.3	0.92				.92	.92
ab	14	1.069		3560	3320	5	0	0	5	1.0	0.05				.05	.05
c_1	5	0.136	610		4500	3	2	12	15	5.9	0.89	1.25	.60vp	2.00	2.89	
c	8	0.349		1220	3500	16	2	20	36	2.1	0.76				.76	
abc	16	1.396		4780	3420	7	0	0	7	0.88	0.06				.06	.06
d_1	3	0.049	225		4500	6	Flexible tubing see Note 1		6	16.2	0.97	1.25	.60vp	2.00	2.97	
d	3½	0.067		225	3360	4	2	10	14	5.2	.73				.73	
abcd	16	1.396		5005	3580	1	1	24	25	0.96	0.24				.24	.24
Trap	See Note 2			5005	3580							.80	1.0vp		.80	.80
e	16	1.396		5005	3580	1	0	0	1	0.96	0.01		See Note 3		.01	.01
f	16	1.396		5005	3580	10	0	0	10	0.96	0.10				.10	.10
Collector	See Note 4												2.0vp		2.00	2.00
g	18	1.767		5005	2840	30	1	28	58	0.54	0.31				.31	.31
Weather Hood	$\left(\frac{H}{D} = 1.0\right)$				2840		See Note 5					.50	.10vp		.05	.05
															Total Pressure See Note 6	7.84

Exhauster must handle 5005 cfm at 7.84 in. total pressure if air is at standard conditions of temperature and barometric pressure. See Note 7.

NOTES

Column 9—All elbows assumed to have inside radius of 1.5*D*. (Junction of branch and main has been included as one additional elbow in branch run.)

Note 1. Resistance of flexible metallic tubing assumed 1.5 × resistance of sheet metal duct. Resistance tests on interlocking joint unpacked metallic tubing. 3 in., 3½ in. and 4 in. dia. indicates average resistance straight run 1.25 resistance sheet metal for velocities 3000 through 6000 fpm. Resistance of 90 deg. elbow is approximately that of 3 ft straight sheet metal duct. Minimum center-line radius for 3 in. dia., 12 in.; 3½ in. dia., 13 in.; 4 in. dia., 14 in.

2. Pressure losses for traps and centrifugal collectors are a function of velocity pressure in inlet duct.
   Simple traps and duct enlargements—0.5 to 1.0 vp
   Low pressure centrifugals—1.0 to 2.0 vp
   High pressure centrifugal—approximately 2.0 to 5.0 vp (consult equipment manufacturers)
3. Where exhauster inlet is smaller than main duct connection, an acceleration loss and increase in velocity pressure occur. For a safe approximation, add the difference between velocity pressure at exhauster inlet and velocity pressure in connecting main to the total pressure requirements.
4. After-vibration resistance may drop to 0.5 in., resulting in increased exhaust volume and brake horsepower. Check power consumption for exhauster when arrester is clean before specifying motor horsepower. Fabric type collectors vary in resistance with dust load and rating. Check with manufacturer for maximum operating resistance of cloth or airmat arresters for each application.

Column 17—Exhaust system is composed of parallel runs; (1) *a*, a_1, *ab, abc, abcd, e, f, g;* (2) b_1, *b, ab, abc, abcd, e, f, g;* (3) c_1, *c, abc, abcd, e, f, g;* and (4) d_1, *d, abcd, e, f, g.* Governing resistance is the run (2) having greatest resistance—(1) equals 5.26 in.; (2) equals 7.84 in.; (3) equals 7.22 in.; (4) equals 7.21 in. Blast gates in *a, c,* and *d* must be adjusted to provide added resistance to equalize pressure loss. Resistance of runs (3) and (4) are so nearly equal to governing resistance (run 2) that blast gates could be eliminated without noticeable unbalance. Blast gate in branch *a* is, however, essential for intended air distribution.

5. Pressure loss through weather hood is a function of height of opening *H* between hood and end of duct. Using diameter of duct *D*, hood losses in velocity heads are: where $\frac{H}{D} = 0.5$, loss = 0.18 *vp;* for $\frac{H}{D} = 1.0$, loss = 0.10 *vp*

   (From "Resistance Tests on Pipe," by A. Nutting, *Mechanical Engineering*, May, 1938, pp 390-391.)
6. Total pressure is sum of static pressure at exhauster inlet plus static pressure on exhauster outlet when inlet and outlet diameters are the same. Exhausters may be rated in total pressure, static pressure, combined resistance pressure. Check particular tables used and note definition of pressures tabulated in performance tables. Where exhauster tables are rated in static pressure, the velocity pressure at the exhauster outlet is usually deducted from the total pressure of the system to determine the static pressure loss.
7. Standard conditions assume .07488 lb per cu ft (dry air at 70F and 29.92 in. Hg. barometric pressure). Normally, corrections are not required for temperatures under 100F or elevations less than 1500 feet above sea level.

charged to the atmosphere. This may be due to the collection of toxic materials in which case recirculation is not recommended under any condition. Frequently efficiency of dust collecting equipment selected is not high enough to make recirculation feasible. In addition many companies and several states prohibit return of air from any exhaust system to the work room.

Except for small volume systems, consideration of the method of air supply warrants more attention than it usually receives. Air cannot be exhausted unless equal quantities are admitted to the work room. During the heating season open doors or windows cannot be used without creating drafts and cold working temperatures. It therefore becomes an essential consideration of an exhaust system installation to provide the necessary supply system for makeup air. Usually it should be tempered and introduced through a distribution system to eliminate drafts and to provide comfortable conditions.

TABLE 10.—EXHAUST REQUIREMENTS FOR GRINDING, POLISHING, BUFFING, SCRATCH BRUSHING ABRASIVE CUT-OFF WHEELS, GRINDING AND POLISHING BELTS

Air Volume: 4500 fpm in all branches. (2 in. suction at average hood)

Grinding or Cut-off Wheels				Buffing, Polishing and Scratch Brushing			
Wheel Diameter, In.	Max. Width*, In.	Branch Dia., In.	Cfm	Wheel Diameter, In.	Max. Width*, In.	Branch Dia., In.	Cfm
through 9	1½	3	225	through 9	2	3½	300
Over 9 through 16	2	4	390	Over 9 through 16	3	4½	500
Over 16 through 19	3	4½	500	Over 16 through 19	4	5	610
Over 19 through 24	4	5	610	Over 19 through 24	5	5½	740
Over 24 through 30	5	6	880	Over 24 through 30	6	6½	1040
Over 30 through 36	6	7	1200				

*Increase branch diameter 0.3 in., but not less than ½ in., for each 1 in. increase in width over dimensions noted.

Horizontal Single Spindle Disc Grinders			Horizontal Double Spindle Disc Grinders			Vertical Single Spindle Disc Grinders		
Wheel Diameter, In.	Branch Dia., In.	Cfm	Wheel Diameter, In.	Branch Dia., In.	Cfm	Wheel Diameter, In.	Branch Dia., In.	Cfm
through 12	3	225	through 19	1-5	610	through 20	1-4½	500
Over 12 through 19	4	390	Over 19 through 25	1-6	880	Over 20 through 30	2-4	780
Over 19 through 30	5	610	Over 25 through 30	1-7	1200	Over 30 through 53	2-6	1760
Over 30 through 36	6	880	Over 30 through 53	2-6	1760	Over 53 through 72	2-8	3120
			Over 53 through 72	4-8	6240			

Grinding or Polishing Belts

To 3 in. wide—3 in. branch. Add ½ in. to branch diameter for each 2 in. or fraction increase in belt width over 3 in.

TABLE 11.—EXHAUST REQUIREMENTS FOR STAVE TYPE TUMBLING MILLS

House and provide inlet openings in bottom of front side of housing. Inlet velocities not less than 400 fpm.

Square Mill Side, In.	Round Mill Inside Dia., In.	Cfm*
	24 incl.	800
24 incl	30 incl.	900
30 incl.	36 incl.	980
36 incl.	42 incl.	1335
42 incl.	48 incl.	1747
48 incl.	54 incl.	2210
54 incl.	60 incl.	2725
60 incl.	66 incl.	3300
66 incl.	72 incl.	3925
72 incl.		4610

*For mills longer than 70 in. (inside length) increase the rate of ventilation over the above values in direct proportion to the increase in length.

Maintenance

While exhaust system maintenance is beyond the scope of this discussion, the designer can be of much assistance in counteracting the tendency of operating personnel to overlook this feature. An exhaust system, with its exhausters and mechanical dust collecting equipment, requires the same attention that production machinery deserves. It will require periodic inspection of exhaust ducts for accumulations of foreign material that might obstruct air flow, checking of exhaust hoods for proper location and condition, checking of V-belt drives to assure proper exhauster speed, and maintenance of dust collecting equipment in accordance with the manufacturer's instructions.

TABLE 12.—EXHAUST REQUIREMENTS FOR WOODWORKING OPERATIONS

Usual Branch Diameter—4,000 FPM in Branches

Equipment	Unit of Measurement,	Size[1]	Branch Pipe No.	Branch Pipe Dia., In.
Saws				
Self-feed table rip	In. dia.	16 incl.—b.b.	1	4½
		Over 16—b.b.	1	5
		All sizes—t.b.	1	4
Swing saw	In. dia.	20 incl.	1	4
		Over 20	1	4½
Rip, table, mitre and variety saws	In. dia.	16 incl.	1	4
		Over 16-24 incl.	1	4½
		Over 24	1	5
Variety saw with dado head	In. dia.	1 branch	1	5
Gang rip saws	In. dia.	24 incl.—t.b.	1	4
		Over 24-36 incl.—t.b.	1	4½
		24 incl.—b.b.	1	5
		Over 36-48 incl.—t.b.	1	5
		Over 48—t.b.	1	5½
		Over 24-36 incl.—b.b.	1	6
		Over 36-48 incl.—b.b.	1	7
		Over 48—b.b.	1	8
Band saw—2 in. max.[2]	Blade width, in.		2	4
Band resaws	Blade width, in.	2-3 incl.—u.r.	1	4
		2-3 incl.—d.r.	1	5
		Over 3-8 incl.—u.r.	1	5
		Over 3-4 incl.—d.r.	1	6
		Over 4-6 incl.—d.r.	1	7
		Over 6-8 incl.—d.r.	1	8
Sanders				
Disc sander	In. dia.	12 incl.	1	4
		Over 12-18 incl.	1	4½
		Over 18-26 incl.	1	5
		Over 26-32 incl.	2	4
		Over 32-38 incl.	1 1	4 5
		Over 38-48 incl.	2 1	4 5

(Continued next page)

TABLE 12 (CONT.)—EXHAUST REQUIREMENTS FOR WOODWORKING OPERATIONS

Usual Branch Diameter—4,000 FPM in Branches

Equipment	Unit of Measurement	Size[1]	Branch Pipe No.	Branch Pipe Dia., In.
Triple drum sander	Drum length, in.	To 30	1	7
		Over 30-36	1	8
		Over 36-42 incl.	1	9
		Over 42-48 incl.	1	10
		Over 48	1	11
Single drum sander	In. dia.	10 incl.	1	4
		Over 10	1	4½
	Surface, sq. in.	Over 400-700 incl.	1	5
		Over 700-1400 incl.	1	6
		Over 1400-2400 incl.	1	7
	Working space, sq. in.	200 max.	1	4
		400 max.	1	4½
Horizontal belt sander —bottom run	Width, in.	9 incl.—t.b.	1	4
		To 6—b.b.	1	4½
		Over 9-14 incl.—t.b.	1	4½
		6-9 incl.—b.b.	1	5
		Over 14—t.b.	1	5
		Over 9-14 incl.—b.b.	1	6
		Over 14	1	7
Horizontal belt sander —top run[3]				
Vertical belt sander	Width, in.	To 6	1	4½
		6-9 incl.	1	5
		Over 9-14 incl.	1	6
		Over 14	1	7
Swing arm sander			1	4
Jointers	Knife length, in.	6 incl.	1	4
		Over 6-12 incl.	1	4½
		Over 12-20 incl.	1	5
		Over 20	1	20
Planers				
Single planers	Knife length, in.	20 incl.	1	5
		Over 20-26 incl.	1	6
		Over 26-36 incl.	1	7
		Over 36	1	8
Double planers	Knife length, in.	26 incl.—b.b.	1	5
		20 incl.—t.b.	1	5
		Over 26-36 incl. —b.b.	1	6
		Over 20-26 incl.—t.b.	1	6
		Over 36—b.b.	1	7
		Over 26-36 incl.—t.b.	1	7
		Over 36—t.b.	1	8
Molders, Matchers, Sizers	Knife length, in.	7 incl.—r.h.	1	4
		7 incl.—l.h.	1	4
		7 incl.—b.h.	1	4½
		Over 7-12 incl.—r.h.	1	4½
		Over 7-12 incl.—l.h.	1	4½
		7 incl.—t.h.	1	5
		Over 7-12 incl.—b.h.	1	5
		Over 12-18—r.h.	1	5
		Over 12-18—l.h.	1	5
		Over 7-12 incl.—t.h.	1	6
		Over 12-18 incl.—b.h.	1	6
		Over 18-24 incl.—r.h.	1	6
		Over 18-24 incl.—l.h.	1	6
		Over 12-18 incl.—t.h.	1	7
		Over 18-24 incl.—b.h.	1	7
		Over 24—r.h.	1	7
		Over 24—l.h.	1	7
		Over 18-24 incl.—t.h.[4]	1	8
		Over 24—b.h.	1	8

(For additional machines, see Table 12 Appendix)

[1]b.b.—bottom branch; t.b.—top branch; u.r.—up run; d.r.—down run; r.h.—right head; l.h.—left head; t.h.—top head; b.h.—bottom head.

[2]Connect one branch pipe to hood under table; the second branch at a point near the floor on the uprun side of the lower wheel. Enclose the entire lower wheel to form the hood.

[3]Use branch sizes recommended for *bottom branch* of "Horizontal Belt Sander (bottom run)." No top branch is required for flat work. For other work, use hood and telescope joint with top branch size indicated for horizontal belt sander (bottom run).

[4]Use 9 in. branch for top head on sizes over 24 in.

Construction Specifications

Proper design and competent installation of sheet steel ducts and hoods are necessary for the proper functioning of an exhaust system. The following specifications are recommended:

General

All work to be constructed of new materials with first class workmanship. Interiors of all ducts shall be smooth and free from obstructions with joints soldered air-tight. Other sealing mediums are permissible where soldering is impractical.

Materials

a. Ducts shall be constructed of galvanized sheet steel. Exception: Presence of corrosive fumes or gases, temperatures over 400F, or other factors which would make galvanized material impractical.

b. For average exhaust systems, the following metal thickness shall be supplied:

Diameter of Straight Ducts	U. S. Gage Number
to 8 in.	22
Over 8 to 18 in.	20
Over 18 to 30 in.	18
Over 30 in.	16

c. For highly abrasive materials or high concentrations of moderately abrasive dusts, straight ducts shall be constructed of metal a minimum of two gages heavier than shown in above table.

d. Elbows and angles shall be a minimum of 2 gages heavier than straight lengths of equal diameter.

e. Hoods shall be a minimum of 2 gages heavier than straight section of connecting branch.

Construction

a. Longitudinal joints of ducts shall be lapped, and riveted or spot-welded on 3 in. centers maximum.

b. Girth joints of ducts shall be made with lap in direction of air flow, with 1 in. lap for diameters through 19 in. and 1¼ in. lap for diameters over 19 in.

TABLE 12.—APPENDIX

Exhaust Requirements for Woodworking Operations

Tenoner—Top head 5 in. branch; bottom head 5 in. branch; other heads 4½ in. to 5 in. branches. Use 4 in. branches where saws are used.

Woodshapers and Variety Machines—4½ in. to 6 in. dia. branch for each spindle.

Miscellaneous—3 in. branch for chain mortises
4 in. branch for dovetail and lock corner machines, dowell machines, duplex molding sanders, forming lathes, panel raisers (each head), ploughs, railshears, routers, sash stickers (each head). 5 in. branch for pulley pockets and pulley stiles, 6 in. branch for glue jointer. 8 in. branch for hogs (up to 12 in. wide), 12 in. branch over 12 in. wide.

Floor Sweeps—6 in. branch for fine dust to 8 in. branch for coarse material. Mouth at floor 10 in. × 4 in. to 12 in. × 5 in. Note: the volume exhausted by floor sweeps need not be included in computing total exhaust requirements.

c. Elbows and angles should have an inside or throat radius of 2 pipe diameters whenever possible but radius shall never be less than 1 pipe diameter. Large radii are recommended for heavy concentrations of highly abrasive dusts. Construct elbows 6 in. or less in diameter of at least 5 sections, over 6 in. diameter of 7 sections. Angles pieced proportionately.

d. Hoods must be free of sharp edges or burrs and reinforced to provide necessary stiffness.

SYSTEM DETAILS

a. Connect duct to exhauster inlet with split sleeve drawband 1 pipe diameter long but not less than 5 in.

b. Transitions in mains and sub-mains to be tapered; taper 5 in. long for each 1 in. change in diameter when possible.

c. All branches shall enter the main at the large end of the transition at an angle not to exceed 45 deg. although 30 deg. is preferred. Connect branches only to top or sides of main with no two branches entering diametrically opposite.

d. Provide dead end caps within 6 in. from last branch of all mains and sub-mains.

e. Provide cleanouts every 10 ft and near each elbow, angle, or duct junction in horizontal sections.

f. Support ducts sufficiently to place no load on connecting equipment and to carry weight of system if plugged with material. Maximum supporting interval is 12 ft for 8 in. or smaller ducts; 20 ft intervals for larger ducts.

g. Provide 6 in. minimum clearance between ducts and ceiling, wall or floors.

h. Provide means of locking blast gates after adjustments have been made to system.

i. Rectangular ducts can be used only when clearances prevent the use of round construction. Rectangular ducts must be as near square as possible. Weight of metal, lap and other construction details is to be the equal of round duct construction whose diameter equals the longest side.

DEVIATION FROM SPECIFICATIONS

Where state or local laws conflict with above specifications, the more stringent regulation shall be followed.

Army Engineers Develop and Operate Floating Power Plant

FLOATING power plants, capable of supplying a small city with electricity, are one of the war-born developments of the Corps of Engineers. The idea was developed after a battleship had hooked up to the power lines of a large northern city and supplied "juice" in an emergency.

Latest and largest of these floating, mobile plants, is the "Inductance," operated by the Memphis, Tennessee, Engineer District, of which Colonel Garner W. Miller is District Engineer. It is rated at 30,000 kw.

Increased Demand

Increased demands for power resulted in overtaxing existing utility systems in various areas throughout the country and necessitated the construction of a mobile unit capable of being readily moved from one location to another to temporarily relieve critical power situations in specified areas until such time as permanent relief could be provided for those areas.

The plant is housed in a steel hull 318 feet long and 50 feet wide and has a maximum draft of 14 feet. Since it is a floating plant, it can be moved to any point accessible to water transportation. Power is generated at 13,800 volts by a 30,000 kw alternator driven by a 19-stage steam turbine. Steam is supplied to the turbine at 850 lb per sq in and a temperature of 900F by two marine express-type boilers equipped to burn either oil or gas separately or simultaneously. Two 300 kw diesel driven generators are provided for emergency use aboard the plant and for starting-up purposes. A three-phase power transformer rated at 37,500 kva is provided to raise the generated voltage to a value suitable for transmission. Taps are provided so that voltages ranging from 63,100 to 138,000 may be obtained as required. Although rated at 30,000 kw, the plant can deliver 36,000 kw for an extended period. A total of 43 persons are required to keep the plant in operation 24 hours per day.

During a 17-month period it generated electrical energy for distribution over the power lines of the Mississippi Power and Light Co. for serving the area around Vicksburg and Jackson, Mississippi, and the Gulf Power Co. for serving the area around Pensacola, Florida. More than 264,724,000 kw hours of electrical energy have been generated to date.

Permits Shutdown

The "Inductance" also has been stationed at Jacksonville, Florida, to supplement the power generated by the city's municipal generating plant. During tremendous load demands on the city power plant, it was not possible to shut down any of the units of the plant for needed repairs. With the "Inductance" supplying power into the municipal power system, the city was able to shut down some of these power units and make the necessary repairs thereto without sacrificing services to the city as a whole.

What the Ventilating Engineer Should Know About

Chlorinated Naphthalene and Diphenyl

The accompanying article is abstracted from a paper by Edward C. Riley, M. D., in The Industrial Bulletin of the New York State Dept. of Labor.

RAPID industrial expansion for war has provided increasing opportunities for industrial poisonings from certain toxic chemicals. A recent increase in cases of occupational dermatitis, "chloracne," and acute or subacute yellow atrophy of the liver, has been attributed to compounds in the chlorinated naphthalene and diphenyl group.

The increased use of these compounds in industry is dependent primarily on certain physical and chemical properties which make them suitable for diverse applications. The lower chlorinated compounds are viscous fluids whereas the higher chlorinated compounds are resinous or waxy solids at room temperature. The most highly chlorinated waxes are almost insoluble but the liquid and resinous products are soluble in most of the common organic solvents, thinners, and oils. As a group they are resistant to the actions of water and alkalies; do not oxidize and will not support combustion; are good electric insulators with high dielectric constants, and remain permanently thermoplastic.

At present most of the material produced in this country is used by the electrical industry to impregnate cable coverings and radio condensers. In certain lacquer and varnish finishes the material is used in small amounts as a plasticiser. Some of the compounds may also be used in mold lubricants, high pressure cutting oils, fire resistant fabric coatings, plastics, and in synthetic rubber substitutes. New uses for these materials are being sought continually and new applications may be introduced at any time.

Many compounds sold under a variety of trade names contain high percentages of these materials and the user may have no knowledge of the composition and potential health hazards. Experience has shown that wherever these compounds are handled without adequate control measures, industrial disease has resulted.

Naphthalene, which has been widely used in moth balls, has the formula $C_{10}H_8$. Diphenyl, $C_{10}H_{12}$, which is made by combining two molecules of benzol, is similar to naphthalene but has no common use. Chlorine can be made to replace any number of hydrogen atoms in either of these compounds. In general, the more chorine atoms introduced into the compound the greater the toxicity. On the other hand the volatility and solubility decrease with an increase in combined chlorine.

Poisoning may result from inhalation of vapors or fumes; from prolonged skin contact with the vapor, fume, liquid or solid phase; or from ingestion of the chlorinated material. In industry these compounds are handled in several ways: In some plants the material is melted in a heated tank where it may be used to saturate electric products or mixed with other compounds to form plastics or protective coatings. The hot melt gives off vapors and fumes which are very toxic and must be removed from the atmosphere by efficient exhaust ventilation. In other cases the compound is dissolved in organic solvents at room temperature. The solution may be used to saturate electrical products or mixed into compounds used for waterproofing and flameproofing fabrics. It is usually necessary to drive off the solvent in a drying oven before the product is completed. During the drying process dangerous concentrations of chlorinated compounds may be driven off along with the solvent, and ovens should be adequately ventilated with fresh air. In the manufacture of electrical condensers, there is also exposure to the fumes released when leads are soldered on to impregnated condensers, as well as skin contact with the cold wax.

Signs of Industrial Exposure

Two distinct manifestations of industrial exposure may be seen. The fumes, as well as prolonged contact with the cold substances, may cause a diffuse eruption of small pimples and sometimes a dark pigmentation of the skin of the exposed areas. When the compounds penetrate or soil the clothing, they may cause similar lesions on the covered parts, the shoulders, arms, abdomen, back, thighs and legs. The lesions begin as small comedones or pimples and may develop into cysts under the skin; some of these may become secondarily infected and go on to suppuration. The pustules resemble acne vulgaris and heal slowly, often leaving permanent scars.

A second, less frequent, condition which may result from industrial exposure is toxic destruction of liver substance. This indicates systemic poisoning which may result from inhalation of vapors or fumes, from absorption through the skin, or from ingestion. Whenever chlorinated naphthalenes or diphenyls are absorbed into the system, the liver is the organ most affected; however, other vital organs may be damaged when the exposure has been great and poisoning severe. Frequently liver damage is detected only after months of exposure when the patient has developed jaundice and is seriously ill.

The symptoms which should make one suspicious of systemic poisoning are: Lassitude, loss of appetite,

loss of weight, restlessness, headache, nausea, vomiting, intestinal cramps and jaundice. Jaundice may be one of the first signs or it may not be observed until the patient has been driven by other symptoms to see a doctor. Whenever it occurs it is an indication that serious liver damage has taken place and competent medical advice should be sought by the patient at once.

Preventive measures include:

Mechanical: (1) Where possible impregnating machines and drying ovens should be completely enclosed and a negative pressure maintained to prevent leakage out.

(2) Where this is not possible, sufficient exhaust ventilation should be provided to control vapors and fumes at the point of generation.

(3) Provision should be made for cleaning all machinery and buildings periodically to prevent accumulation .of deposits and secondary exposures. This should be done only by experienced crews with adequate personal protective equipment.

Medical: (1) Pre-employment and periodic medical examinations should be provided for all workers exposed to chlorinated naphthalenes and diphenyls.

(2) Workers should be encouraged to report all skin conditions and other signs of injurious exposure to the plant management and their family physicians.

(3) Skin cases should be seen daily at the plant dispensary.

Hygienic: (1) Each worker should be provided with two lockers, one for his street clothes and one for his work clothes.

(2) Protective clothing should be supplied and maintained by the management.

(3) Suitable skin creams may prove helpful and may be used at the discretion of the plant physician.

(4) At least twice a week, a complete set of clean work clothes should be provided for every exposed worker.

(5) Either the employee or his foreman should be apprised of the toxic nature of the material and both should be instructed in safe handling procedures.

Schools with Courses in Air Conditioning

In response to repeated inquiries arising out of interest in the special section, "An Introduction to Air Conditioning for the Veteran," published in the September issue of HEATING AND VENTILATING, we are pleased to publish the following partial list of schools where training for the field of air conditioning may be obtained. For compiling the list, we gratefully acknowledge the courtesy of Walter J. Greenleaf, Specialist, Occupational Information and Guidance Service, U. S. Office of Education.

Public Vocational High Schools located in: (Federally aided 1937)

Alabama—Birmingham
California—Los Angeles; San Jose
Colorado—Denver
Connecticut—Bridgeport
Florida—Tampa
Georgia—Atlanta; Columbus; Macon
Illinois—Joliet
Indiana—Evansville
Iowa—Burlington; Cedar Rapids; Clinton; Sioux City
Kansas—Arkansas City; Lawrence; Newton; Pittsburgh; Topeka; Wichita
Michigan—Detroit; Kalamazoo; Pontiac
Missouri—Kansas City; St. Joseph; St. Louis
New York—Rochester
Ohio—Cincinnati; Cleveland; Dayton
Oklahoma—Tulsa
South Dakota—Sioux Falls; Yankton
Texas—Austin; Houston; San Antonio
Utah—Salt Lake City
Virginia—Richmond
Wisconsin—Appleton

Trade Schools:

ILLINOIS

Alton—C. F. Schoeck School
Chicago—American School, Drexel Ave. & 58th St.
Coyne Electric & Radio School, 500 S. Paulina St.
Refrigeration & Air Conditioning Institute, 2158 Lawrence Ave.
Siebel Institute of Technology, 958 Montana St.
Utilities Engineering Institute, 404 N. Wells St.
Greer College of Elec. Refrigeration, 2024 South Wabash Ave.

MICHIGAN

Detroit—Detroit School of Refrigeration, 6505 Grand River Ave.

NEW YORK

Brooklyn—YMCA, Bedford Branch, 1115 Bedford Ave.
New York—Delehanty Institute, 11 East 16th St.
Herkimer Institute, 1819 Broadway
Industrial Training Corp., 11 West 42nd St.
New York Technical Inst., 108 Fifth Ave.
New York Trade School, 304 East 67th St.
Refrigeration & Air Cond. Inst., 11 West 42nd St.
Technicians Institute, 244 West 14th St.
Thermo Air Conditioning Inst., 1765 Broadway
Utilities Engineering Institute, 17 West 60th St.
YMCA Trade & Technical School, 5 West 63rd St.

Universities offering Air Conditioning Courses:

Illinois—University of Illinois, Urbana
Kentucky—University of Kentucky, Lexington
Louisiana—Louisana State University, Baton Rouge
Massachusetts—Massachusetts Institute of Technology, Cambridge
Minnesota—University of Minnesota, Minneapolis
New York—Pratt Institute, Brooklyn
Columbia University, New York City
New York University, New York City
Oklahoma—University of Oklahoma, Norman
Texas—A & M College, College Station
Wisconsin—University of Wisconsin, Madison
Louisiana—Tulane University, New Orleans

Clearing Up a Misconception in the Employment of Veterans

C. CHARLES BURLINGAME, M. D.

Psychiatrist-in-Chief, The Institute of Living,
Associate in Psychiatry, Columbia University,
Chairman, Sub-Committee on Psychiatry of the
NAM Medical Advisory Committee

The accompanying article has nothing to do directly with heating or ventilating; it does, however, concern all of us in business, not only in that fairness to one group of veterans is involved, but for selfish reasons as well in not overlooking valuable potential employes. A serious misconception of this subject is currently prevailing.
— Editor

WHAT are the practical implications of the term "neuropsychiatric" which has been applied to so many discharged veterans? In order to answer this question, I am expressing the following opinions as one of three psychiatrists to whom has been posed the very important problem of the effect on industry of releasing into civilian pursuits supposedly vast numbers of neuropsychiatric cases discharged from the armed forces. We have been requested to make suggestions concerning what should be done with the so-called neuropsychiatric dischargees whom industry is expected to employ or reemploy. It has been assumed that this problem is one separate and distinct from all other problems concerning postwar industry. I am happy to be able to report that, as a result of an extensive survey of various industrial organizations, this problem is not as serious as the layman may have imagined.

By way of introduction, perhaps it would be well to state that the term "psychoneurosis" does not designate a disease in the sense that pneumonia, typhoid, or malaria do. The term psychoneurotic is more of a social diagnosis. It affects the individual relationship of all people to other people in their homes, in their employment, and in their social environment. A psychoneurotic requires an adjustment, as an individual, to his environment and occupation. Briefly, psychoneurosis may be defined as an emotional upset developed to the point where it interferes with the individual's efforts in his employment or with his domestic life or social relationships. Everyone, at one time or another, and in varying degree, exhibits such symptoms.

Obviously, the adjustment to military life for a man established in peaceful pursuits and relationships greatly affects his emotional life. If he fails in any of the required adjustments, he is discharged as a psychoneurotic. In civilian life, this same man might make a very satisfactory adjustment to his employment relationship and be an extremely valuable employee. The effort to make the necessary adjustments to military life may have caused increased irritability, seeming indifference, or other traits indicating a lack of the usual interests.

The sum and substance of all this is that we need to pay little or no attention to whether or not a man was discharged from the armed forces as a psychoneurotic. This term, as a basis for discharge from the armed forces, amounts to nothing more than saying that he did not have the personal traits which enabled him to become a satisfactory member of the armed forces. The inability of a man to adjust himself to military life and conditions does not imply inability to make a satisfactory adjustment to industrial or business occupations. Unfortunately, the term psychoneurotic, which has been used as a label for this entire group, has been greatly misunderstood by manufacturers and others in civilian life.

Throughout industry there are thousands of psychoneurotic people being successfully employed. In the past, it may have been found that they were not suited to some particular job, but quite satisfactory in another position. They were never ruled out as undesirable for employment. There is no more reason to look upon the discharged veteran in that light. If emotionally upset through his war service, the return to normal conditions will soon restore him to his normal frame of mind.

I could dwell at length upon the observations upon which these conclusions are based, but one reference will be sufficient. In one large plant, employing tens of thousands of men, returned veterans are being hired without regard to the circumstances surrounding their discharge from the armed forces; the sole basis for employment is the veteran's past training and skill. No attention whatever is being paid to whether he was discharged as a psychoneurotic. After a period of months of employment, the work record of these veterans was compared with that of non-veteran groups. It is of interest to note that nearly one-third of the veterans rated higher in productivity than the average of the entire plant; and a little over one-third of these veterans had developed higher skills than they had before entering the armed forces.

Furthermore, there seemed to be no connection whatever between the success or failure in industrial work between the veterans discharged for neuropsychiatric reasons and those discharged by the armed forces for other reasons. Hence, I am forced to the conclusion that the presence or absence of psychoneurosis as a discharge factor in the armed forces has no bearing whatsoever on re-employability.

Theory vs. Practice

JOHN J. WOOLFENDEN

Engineering Staff, Smith, Hinchman & Grylls, Inc., Detroit, Mich.

"WHEN theory and practice do not coincide, the practice cannot be wrong."

This saying embodies a principle which was impressed upon every student of the late Prof. M. E. Cooley, Dean, College of Engineering, University of Michigan. It is true to the extent that "if it works, it works," regardless of all reasons why it should not work.

For example, it has been pointed out in various recent articles that, according to accepted theories of aerodynamics, the bumble bee cannot fly. However, never having been instructed in such matters, the bee continues to fly, just as he always has done.

What, do you suppose, would be the result if he could be made to understand that he cannot fly? Would the species gradually lose powers of flight through loss of confidence in ability to fly, or would they simply say "Well, whether we can or cannot fly, we do fly," and continue, undisturbed, on their regular, determined way?

As a matter of fact, when theory does not coincide with practice, the reason is that the wrong theory was applied or that the right theory was incorrectly interpreted, for natural laws are immutable.

Case of a Vacuum Pump

The writer well remembers the case of a vacuum return pump which, through a lift pocket, drew condensate from some 200 feet of 3-in. return main.

Every time the pump operated under vacuum control, the excess of condensate flooded the boiler, while between operations, the water became so low that make-up was often required.

The building was several stories high and the return risers dropped into the 3-in. line, which ran around the basement wall, near the floor. The return was, therefore, fundamentally a wet return, although as it filled with condensate, the increase in pressure due to displacement of the air (?) by the accumulating condensate, would tend to lower the vacuum.

Should it become a wet return, the risers would be effectively sealed off, and the system would be air bound, as long as this condition existed.

Everything which promised a solution was tried, but without any definite results. Having exhausted our stock of theoretical remedies which should work, according to theory, it was decided to try some which (also according to theory) should not work.

The contractor was therefore requested to remove the drop nipple from the lift pocket. This, when done, made the lift pocket simply an enclosed chamber, with inlet in the side and outlet in the top, but left no submerged-end suction pipe therein.

As before pointed out, this would result in effectively sealing the risers off at their lower ends and might completely air bind the entire system.

The pump would virtually have to operate under float control. It had no positive power to lift water from the lift pocket, but had to wait for the condensate to rise in the system until it overflowed into the receiver.

After the removal of the nipple, the operation of the system was observed for an hour or two. The operation seemed to be entirely satisfactory, as the pump could discharge into the boiler only those quantities of water which were controlled by the "on" and "off" positions of the float.

When a report of these proceedings was made to the designer of the system, he raved at such an insane idea.

Why It Functioned

"Now you have done it!" said he, "How are you going to keep the system from air binding?"

The only reply possible was: "It hasn't air-bound so far; perhaps it won't. At least we are going to wait and see what happens. We tried everything we could think of that ought to work—and it didn't; now we are trying something that we think ought not to work—but maybe it will."

And it did! Why? Because, in handling the water, the pump must produce a partial vacuum on the return system. Any open radiator traps would permit this vacuum to operate in the radiation, while air in the risers would be drawn into the return main and finally reach the pump, where it would be discharged through the air vent valve.

It must be remembered that the system, also including the lift pocket, would be flooded up to the short horizontal connection to the receiver, when the pump "cut in" and that the extent of the return main afforded an opportunity for the condensate to cool. The partial vacuum produced in this pipe must have drawn a certain amount of water from the system, each time, thus unsealing the lower ends of the risers, periodically, and relieving them of at least a portion of the air.

At any rate, the system continued to work. The operator was instructed to report immediately the slightest indication of trouble and, for the first week after the change was made, the job was visited daily. For the succeeding three weeks, semi-weekly visits were made and, as there were no signs of distress, the system was then left on its own.

That was about fourteen years ago—and the system hasn't air-bound yet. Perhaps is really isn't going to.

Selection of COOLING COILS

GEORGE K. MARSHALL
Commercial Engineering Division
General Electric Company
Bloomfield, N. J.

HEATING AND VENTILATING'S REFERENCE SECTION

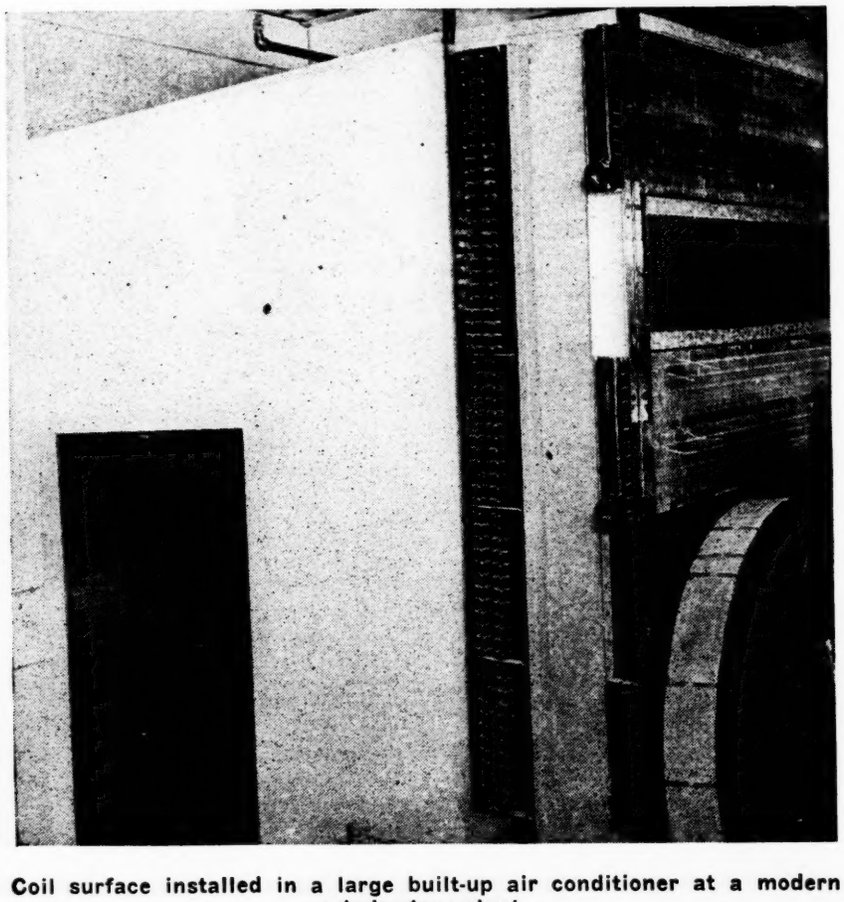
Selection of COOLING COILS

GEORGE K. MARSHALL
Commercial Engineering Division
Air Conditioning Department
General Electric Co.

CALCULATING heat transfer through finned coils is perplexing to the application engineer who is interested primarily in combining components into a finished system. He finds the selection of coils a bothersome task which takes considerable time. In many cases the selection method is not susceptible to visual analysis and after struggling through a maze of meaningless figures the answer comes out of a hat like a magician's rabbit. Such procedure is not conducive to faith in one's work and it is quite understandable that the manufacturer would be called on for many coil selections and many final checks, resulting in duplicated effort.

Accurate coil selection methods are difficult to formulate and it is conceivable that the manufacturers would come up with many methods and sometimes many answers. Nevertheless there are some well established facts and these together with some generally accepted theorems can be used to present a reasonably clear and useful picture of finned coil heat transfer.

Condensing water vapor, that is dehumidification, adds complications to an already difficult problem and should be considered separately. It is actually a function added to sensible cooling and is easiest understood when considered in that light. Fig. 1 indicates that the sensible heat transfer from the air to the coil is the result of temperature difference while the latent heat transfer from the air to the coil is the result of vapor pressure difference. Thus these two functions occur, in effect, independently of one another and can be independently calculated. The heat transfer from the coil to the refrigerant is the result of temperature difference and this temperature difference must transfer the total heat—latent and sensible—from the coil to the refrigerant.



Coil surface installed in a large built-up air conditioner at a modern windowless plant.

Cooling Without Latent Removal and Heating

The ability of a coil to transfer heat under given conditions depends on three factors as shown in Fig. 2. They are the resistance to heat flow between the heating or cooling medium and the inside tube surface, the resistance to heat flow through the metal, and the resistance to heat flow between the metal surface and the air. Like any other heat flow problem and like an electric circuit, the conductance depends on the sum of the resistances in series.

Resistance r_i is the resistance to heat transfer from the refrigerant or steam, depending on the duty of the coil. Resistance r_m is the resistance to heat transfer of the metal. Resistance r_a is the resistance to heat transfer from the coil to the air. The total resistance is then

$$r = r_a + r_m + r_i$$

Conductance is inversely proportional to resistance and if we call conductance k, then $r = \frac{1}{k}$. Therefore, the reciprocals of the individual conductances can be added to obtain the reciprocal of the total conductance just as the resistances can be added. If U is the overall conductance and k_1, k_2 and k_3 are the individual conduct-

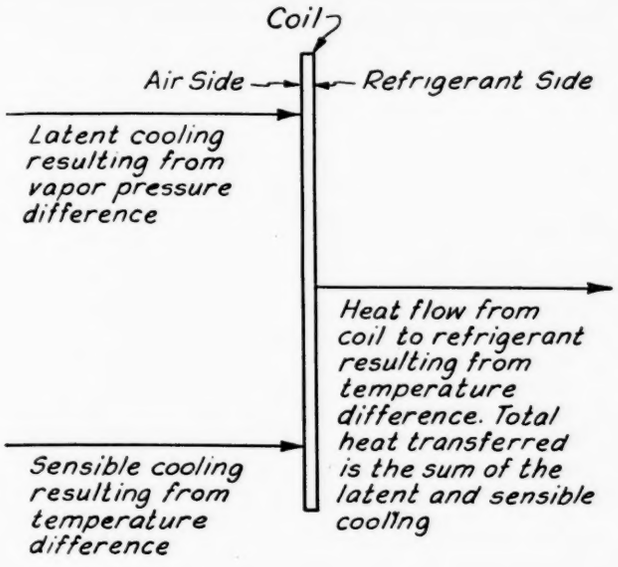

Coil
Air Side
Refrigerant Side
Latent cooling resulting from vapor pressure difference
Heat flow from coil to refrigerant resulting from temperature difference. Total heat transferred is the sum of the latent and sensible cooling
Sensible cooling resulting from temperature difference

Fig. 1. Heat flow in cooling and dehumidifying.

ances, then:

$$\frac{1}{U} = \frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{k_3}$$

Thus by taking the individual conductances the conductance of the entire coil can be found. Conductances must, of course, be based on the areas normal to the path of heat flow. They are expressed as Btu per hour per *sq ft* per degree F. In a coil, unlike the wall of a house, the area that the heat passes through is not uniform. Heat is transferred from the heating or cooling medium to the inside of the tube. The heat transfer within the metal of the coil is from the inside surface to the increased area of the outside surface and then a large part of it through the thin fins. Heat is then transferred from the comparatively great surface of the tubes and fins to the air.

The conduction calculations must refer to a base area, and the outside area of the fins and tubes is usually taken as the base area.

The path of the heat conducted through the metal is intricate and offers comparatively little resistance to the heat flow. Consequently, it is usually combined with either the refrigerant to metal or the metal to air coefficient. For the purpose of this paper, it is combined with the metal to air coefficient and is designated as *xh*, Btu per hr per degree F per sq ft. Where *h* is the air to coil surface coefficient and *x* is a dimensionless factor depending on the fin and tube design, and developed so that the product *xh* is the combined coefficient.

The inside coefficient h_i is also in terms of Btu per hr per sq ft per degree F. While on the outside, heat is being transferred over a sq ft of surface, in the inside heat is being transferred to a much smaller area, different by the ratio of the two areas. It is obvious then that the conductance per sq ft of inside surface must be divided by the ratio of the outside to inside surface areas, *R*, in order to refer the conductance to the outside area.

The overall conductance, referred to the outside area, is then:

$$U = \frac{1}{\frac{1}{xh} + \frac{R}{h_i}}$$

Heat transfer then follows the well known formula:

$$A = \frac{H_s}{U\ (t_1 - t_2)}$$

Where A = Outside area of fins and tubes
H_s = Sensible heat load
$(t_1 - t_2)$ = Temperature difference

The temperature difference, however, unlike the usual heat transfer problem, varies throughout the coil. For example, in the case of a coil using water as a refrigerant, the air entering is 80F and the air leaving is 65F. The water entering is 55F and leaving it is 60F. The temperature differences are illustrated in Figs. 3, 4 and 5. When the flows are counter or parallel $t_1 - t_2$ is the logarithmic mean temperature difference, *LMTD*. When the flow is cross or mixed, the latter being some combination of the others, then $t_1 - t_2$ is not strictly the *LMTD* and consequently must be corrected.

It can be seen from this that finned coil heat transfer can be reduced to simple well known heat transfer rules. The actual calculations are difficult even with a fixed coil design because the temperatures and coefficients vary. The outside coefficient varies with the air velocity and density. The inside coefficient varies with the velocity, physical properties of the fluid and, in some cases, the load. These are manufacturers' problems and it is their concern to coordinate and simplify them in order to present a reasonable selection method to the application engineer. It is not an easy task and it is aggravated by the fact that coil selection methods are, of necessity, cut-and-try procedures. The following formula, repeated here for convenience, is often used in its basic form for water coil selection:

$$A = \frac{H_s}{U\ (t_1 - t_2)}$$

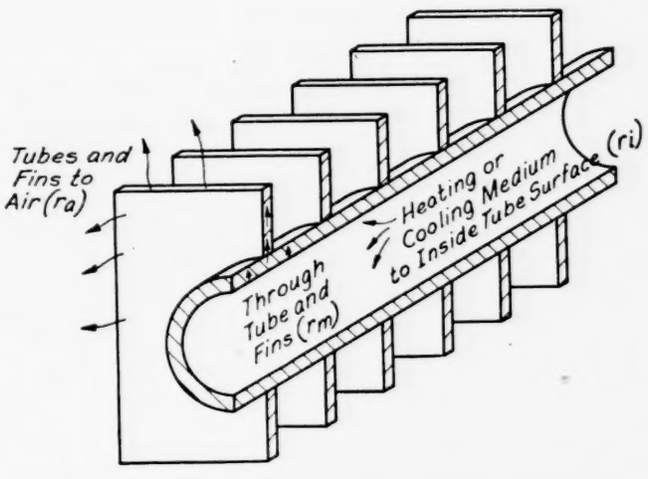


Fig. 2. Resistance to heat flow through a finned coil (heating).

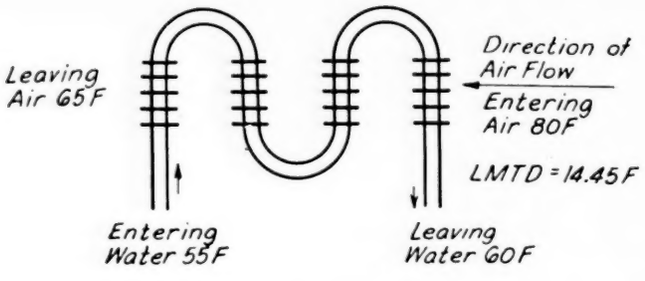


Fig. 3. Counter flow.

The load, airflow, air temperatures, water flow and water temperatures are usually fixed. However, to obtain U, the face velocity must be assumed and, with a fixed airflow, the face area of the coil then becomes fixed. Chances are when the calculated coil area A is divided by the fixed area per row, the answer will be something like 2.3 rows required. The engineer must choose between a 2 and a 3 row coil or assume another face velocity and start all over again.

Cooling With Latent Removal

In the previous references to heating and sensible cooling, the overall heat transfer coefficient U was used. The heat flow calculations were made in one step, that is, directly from the air to the refrigerant. When moisture is condensed from the air, that is when latent cooling takes place, the ratio of latent cooling to sensible cooling depends on the temperature of the cooling surface. It is obvious then that consideration should be given the coil surface temperature which requires that the overall coefficient be broken down into its components, the inside and outside coefficients, so that the performances between the coil surface and the refrigerant, and the coil surface and air can be considered separately. Actually, the coil surface temperature varies considerably. However, it is possible to determine what uniform surface temperature would give the same performance as the coil under actual operating conditions; that is, the apparent coil surface temperature.

The process of finned coil cooling has been premised as the cooling of that air which is in immediate contact with the fins and tubes to the surface temperature and subsequent mixing of this air with uncooled air, resulting in a mixture which on a psychrometric chart plot falls on a line between the entering air temperature and the surface temperature as in Fig. 6. The surface temperature is

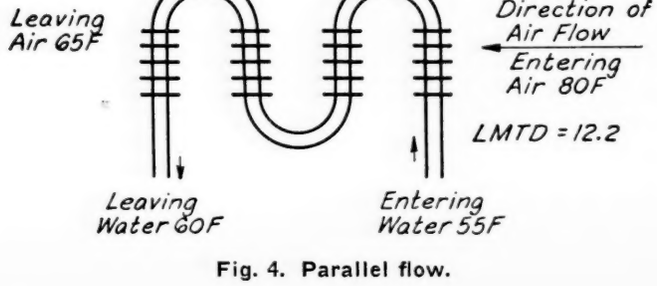


Fig. 4. Parallel flow.

plotted on the saturation line because the surface temperature is below the dew point temperature of the air and consequently the air cooled to the surface temperature will be saturated. If it were not, it would not be dehumidified. Thus a line connecting the entering conditions and the surface temperature is the locus of leaving conditions. In addition, the reduction of the heat content of any mixture leaving the coil will be in the same ratio of latent to sensible heat removal as the air in immediate contact with the coil surface. This is the result of the linear relationship that exists between temperature differences and vapor pressure differences. Therefore, a line from the entering conditions to the surface temperature is not only the locus of all leaving conditions, but also represents a constant ratio of latent to sensible cooling.

The practical aspects of this are obvious. The entering and leaving conditions can be plotted on the psychrometric chart. A line connecting the two and extended will intersect the saturation line at the

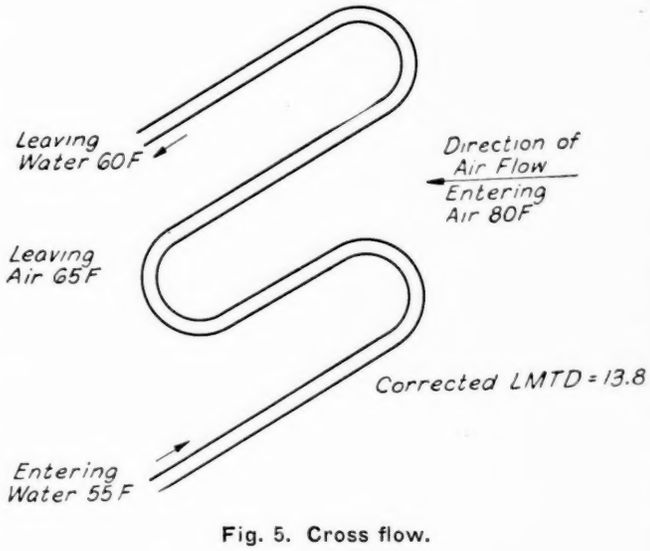


Fig. 5. Cross flow.

surface temperature required to obtain the desired ratio of latent to sensible cooling. Thus immediately, the coil surface temperature is established. There remains then only the need of proportioning the coil and the airflow so that the air will be cooled along this line (from the entering conditions toward the surface temperature) to the point designated as the leaving air conditions.

It is obvious from this that since the leaving conditions fall on the line connecting the entering conditions and the surface temperature, then the sensible cooling alone, that is, the temperature reduction, will locate the leaving conditions.

The temperature reduction can be determined by relating the entering, leaving and surface temperatures for any given coil and airflow. This relationship can be found by equating the sensible heat removed to the heat transfer from the air to the surface:

$$(t_1 - t_2)\ cpw = \left(\frac{(t_1 - t_s) - (t_2 - t_s)}{L_n \quad \frac{t_1 - t_s}{t_2 - t_s}} \right) (xh\ A)$$

where t_1 = entering air dry bulb temperature
t_2 = leaving air dry bulb temperature
t_s = surface temperature
cp = specific heat of air
w = pounds flow of air per hour
xh = outside, heat transfer coefficient Btu per hr per sq ft per deg F.
A = area of coil surface
L_n = natural logarithm

The solution of this formula can be facilitated by introducing as a mathematical expedient the factor C_a so that ultimately the formula develops as follows:

$$C_a = 1 - \frac{1}{\frac{xhA}{cpw}} = \frac{t_1 - t_2}{t_1 - t_s}$$

From the first relation, it is evident that the coil area, the outside air coefficient and the airflow determines the C_a regardless of the temperatures involved. Therefore charts can be drawn with C_a values plotted against face velocity for various depths of coils. From the second relation, it can be seen that the C_a

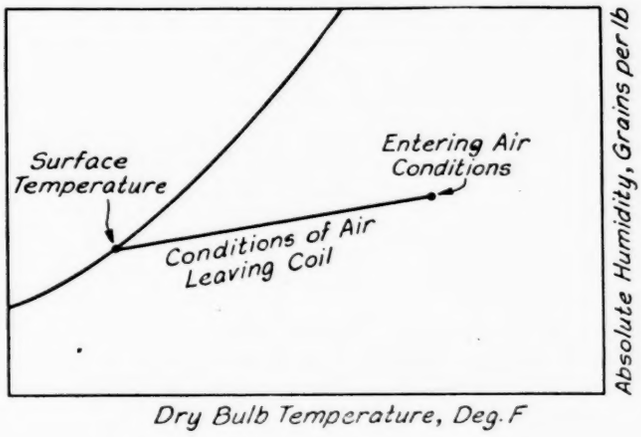

Surface Temperature
Entering Air Conditions
Conditions of Air Leaving Coil
Absolute Humidity, Grains per lb
Dry Bulb Temperature, Deg. F

Fig. 6. Straight line cooling plotted on psychrometric chart.

governs the temperature reduction of the air in respect to the difference between the entering air temperature and the surface temperature, the latter being maximum that the air can be cooled. Thus, as shown in Fig. 7, C_a is the actual temperature reduction expressed as a fraction of the maximum possible temperature reduction:

$$C_a = \frac{\text{Actual temperature reduction}}{\text{Maximum temperature reduction}} = \frac{t_1 - t_2}{t_1 - t_s}$$

The following practical example illustrates this procedure.

A coil is required to handle a load of 104,000 Btu per hr sensible and 30,600 Btu per hour latent, a total of 134,600 Btu per hr. Air entering the coil will be at 80F dry bulb with a moisture content of 76 grains per lb. The desired air changes will require an airflow of 5,000 cfm.

The temperature drop and the moisture reduction of the air passing through the coil can be calculated from the well known formulas:

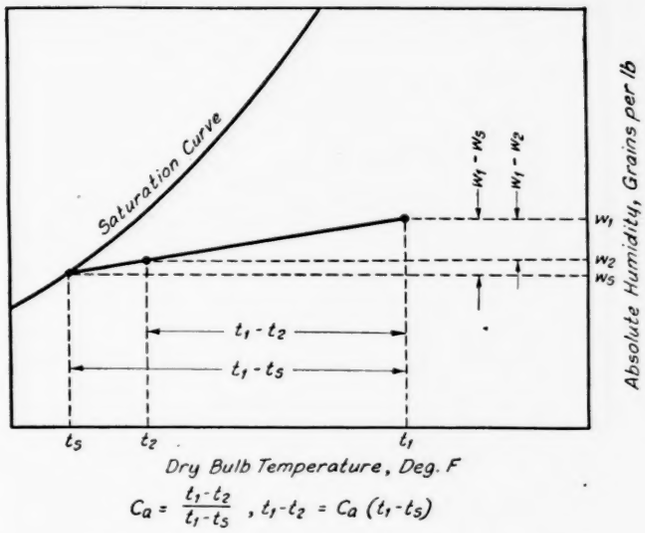


Fig. 7. Use of C_a and straight line cooling.

$$t_1 - t_2 = \frac{H_s}{1.08 \times \text{cfm}}$$

$$w_1 - w_2 = \frac{H_l}{0.68 \times \text{cfm}}$$

Where t_1 = entering air dry bulb temperature
t_2 = leaving air dry bulb temperature
w_1 = entering air moisture content in grains per lb
w_2 = leaving air moisture content in grains per lb
H_s = sensible load in Btu per hr
H_l = latent load in Btu per hr

$$t_1 - t_2 = \frac{104{,}000}{1.08 \times 5{,}000} = 19.25\text{F}$$

$$w_1 - w_2 = \frac{30{,}600}{.68 \times 5{,}000} = 9.0 \text{ grains per lb}$$

The leaving conditions of the air are then as follows:

$$t_2 = 80 - 19.25 = 60.75\text{F}$$

$$w_2 = 76 - 9 = 67 \text{ grains per lb}$$

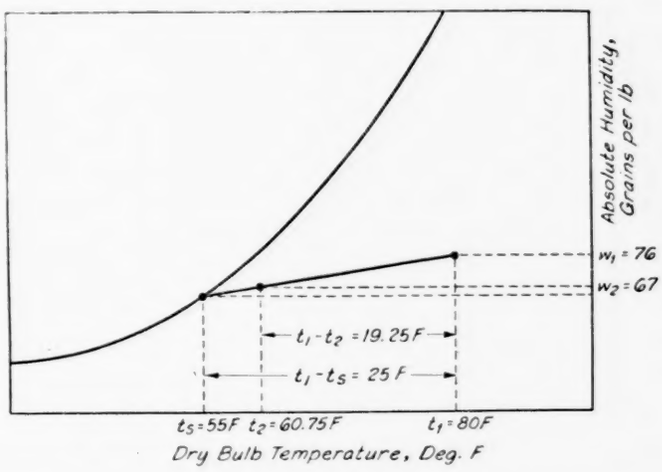

Absolute Humidity, Grains per lb
$w_1 = 76$
$w_2 = 67$
$t_1 - t_2 = 19.25\text{F}$
$t_1 - t_s = 25\text{F}$
$t_s = 55\text{F}$ $t_2 = 60.75\text{F}$ $t_1 = 80\text{F}$
Dry Bulb Temperature, Deg. F

Fig. 8. Coil selection example plotted on a psychrometric chart.

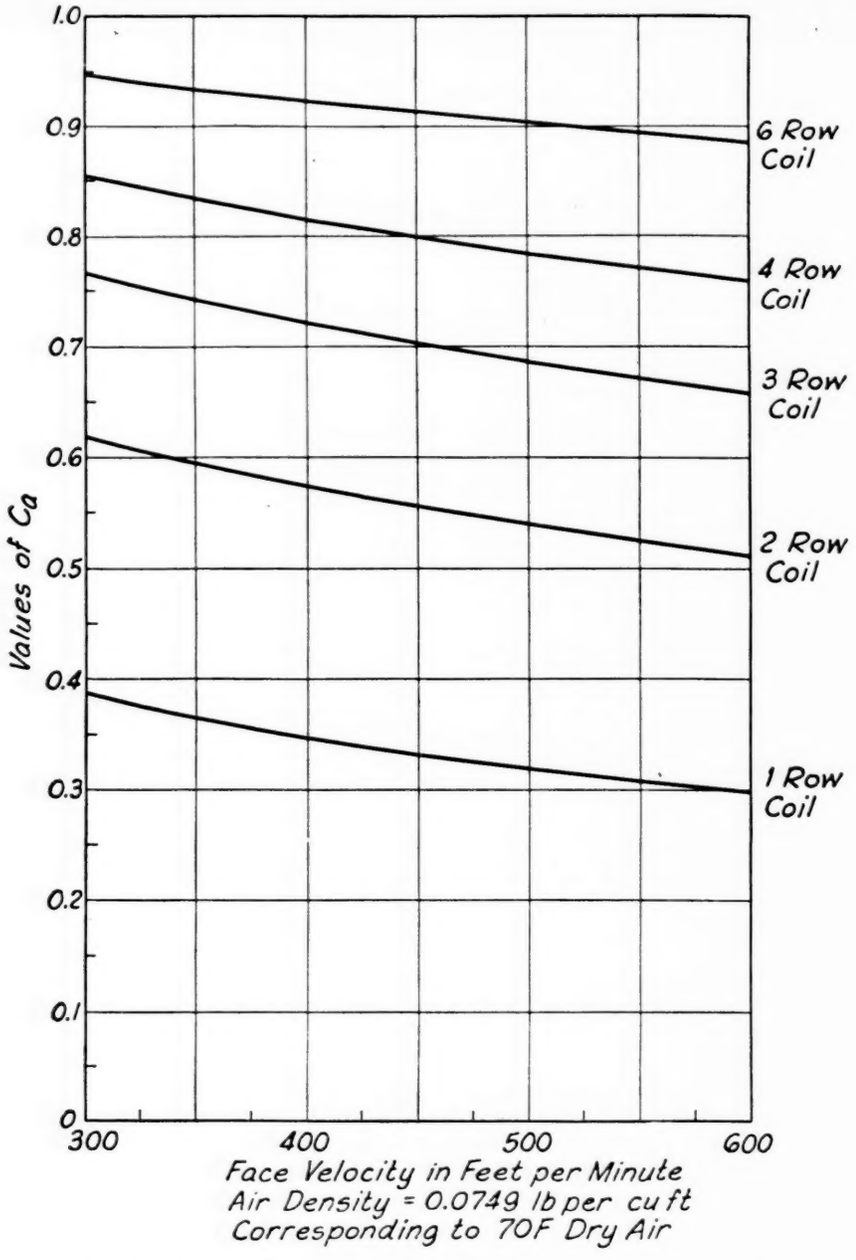


Fig. 9. Values of C_a vs face velocity for typical copper coils.

Fig. 8 shows the entering and leaving conditions plotted on a psychrometric chart. A line is drawn between the two points and is extended to the saturation line. The required surface temperature t_s is then read at the intersection of these two lines. In this case $t_s = 55$F.

The required C_a value can then be calculated from the formula given before

$$C_a = \frac{t_1 - t_2}{t_1 - t_s} = \frac{80 - 60.75}{80 - 55}$$

$$= \frac{19.25}{25} = 0.77$$

Analyzing these calculations in the light of the previous explanation, the procedure has been as follows. Since the line connects the entering air conditions and the surface temperature, or more correctly, the apparent surface temperature, then the air, regardless of the amount, will be cooled along this line. If the coil is comparatively deep, or if the air velocity is comparatively low, then the leaving air conditions will be near the surface temperature and nearly saturated. With a decrease in coil depth or an increase in air velocity, the leaving conditions will approach the entering air conditions, but still falling on the same line. The required leaving conditions will be obtained because the line was purposely drawn through the point of the leaving air conditions. Therefore, with the entering conditions specified, the surface temperature selected, and this temperature only, it is possible to select a coil depth and air velocity that will give the required leaving conditions.

The location of the leaving air conditions on this line determines what the C_a value should be and is calculated to be 0.77 or, in other words, $\frac{77}{100}$ of the distance from the entering air conditions to the surface temperature.

Fig. 9 shows typical C_a values obtained from combinations of air velocity and coil depths. It can be seen that a four-row coil with a face velocity of 560 fpm will have the required C_a value. Since 5000 cfm passes through the coil, the face area of the coil should be:

$$\frac{5000}{560} = 8.95 \text{ sq ft}$$

At this point it should be recalled that air cooled from the entering air conditions to any point on the line connecting the entering air and surface temperature will be subject to a constant ratio of sensible to latent cooling. Consequently, the leaving air conditions could have been anywhere on this line, depending only on the amount of air used. As an example, if using 5000 cfm placed the leaving conditions very close to the saturation line which would result in the selection of a large coil, then it would have been in order to increase the airflow, say to 6000 cfm. The leaving conditions would then be moved along the line toward the entering air conditions.

This procedure has led to actual coil selections and the required apparent surface temperature of the coil. The next step is to determine the refrigerant temperature required to maintain this surface temperature.

When using a non-volatile refrigerant, the refrigerant temperature increases as it absorbs heat during passage through the coil circuit. Practical refrigerant velocities cover a broad range and, of course, affect the inside heat transfer coefficient. This coefficient is also affected by the refrigerant physical properties, thermal conduction, specific heat, density, viscosity

and, in the case of brines, concentrations. The physical properties in turn vary with the temperature. It is obvious that consideration of all these variables requires a somewhat involved procedure which would not be particularly helpful here since the objective is to illustrate a coil selection method which has been done and all that remains is to give the coil the required surface temperature. The use of volatile refrigerants eliminates or limits many variables, the most important of which is the temperature variable. The refrigerant temperature in a direct expansion coil is nearly constant. Consequently, the procedure for establishing the coil surface temperature is quite simple.

Fig. 10 shows typically the temperature differential (D_r) of the coil surface and the refrigerant ($t_s - t_r$) plotted against the total coil load in Btu per hr per sq ft of face area for coils of various depths. In the example above it was found that the coil should be four rows deep and have a face area of 8.95 sq ft. The surface temperature should be 55F.

The load per sq ft of coil face area is:

$$\frac{134{,}600}{8.95} = 15{,}050 \text{ Btu per hr}$$

Referring to Fig. 10, it is found that a four-row coil with a load of 15,050 Btu per hr will have a temperature differential (D_r) of 12.3F.

$$D_r = t_s - t_r = 12.3 \text{ deg}$$

$$t_r = t_s - 12.3 = 55 - 12.3 = 42.7\text{F}$$

Thus a refrigerant temperature of 42.7F will, under these conditions, provide a surface temperature of 55F. The coil selected, with this surface temperature, will remove the quantity of heat desired and in the proper proportions of sensible and latent cooling.

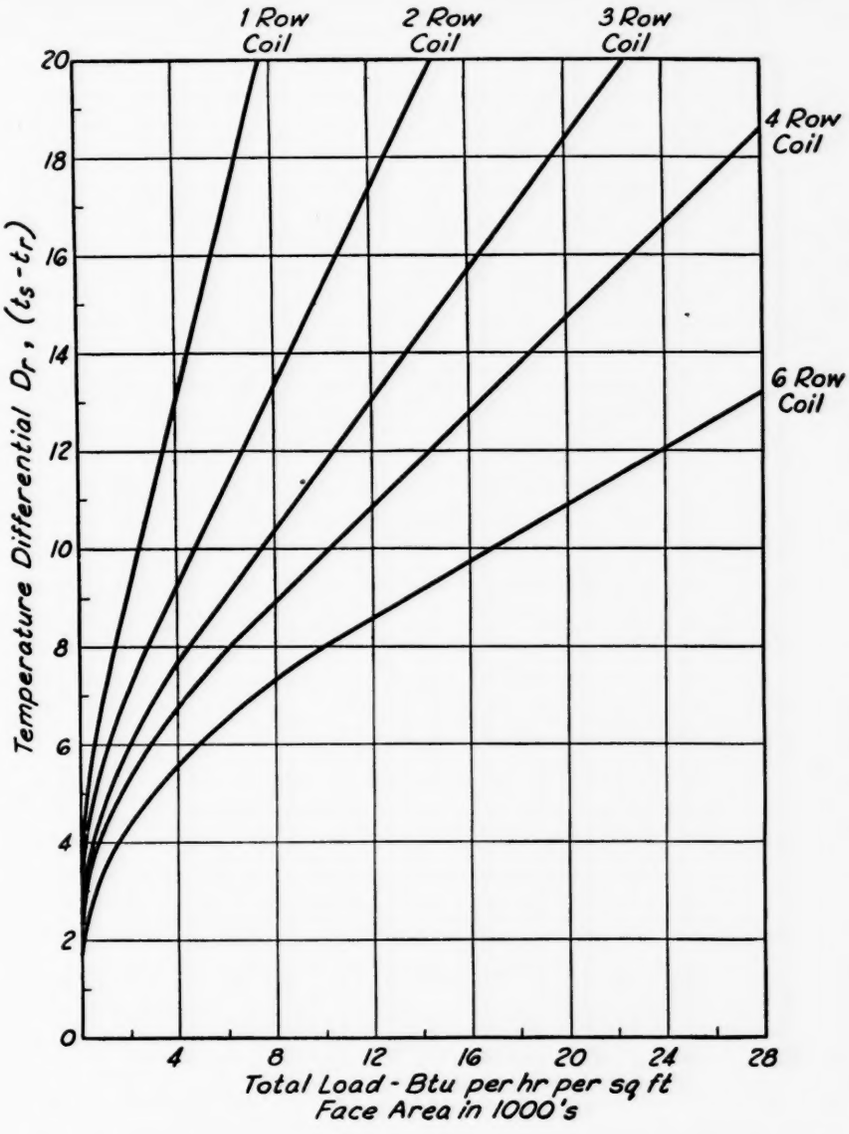


Fig. 10. Temperature differential between coil surface and refrigerant for same coils as in Fig. 9.

Conclusion

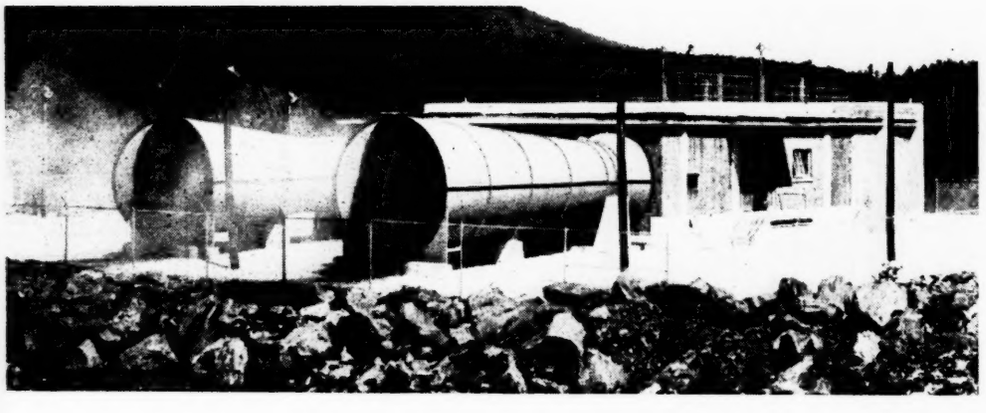
This article was prepared as an aid to the engineer who can profit by a better understanding of finned coil heat transfer but cannot allot the time required for a comprehensive study. It is also intended to commend this particular method of selecting air conditioning coils. It is recognized that there is considerable controversy regarding the phenomenon of air cooling and dehumidifying and it is not intended to set forth this method as the final answer. It is, however, a method with accuracy well within acceptable limits and with the advantage of being subject to visual analysis. With a little experience the application engineer can construct the problem on the psychrometric chart and actually visualize the path of the air through the coil and the effects of varying the surface temperature, face velocity, load ratio, etc.

Coil selection methods have recently given way to selection tables. The tables, under favorable conditions, present a quick method of determining the required coil size. However, in many cases, limiting conditions, varying conditions and interpolation make the use of tables very confusing. The engineer who has become familiar with a good selection method finds it faster and more satisfactory. There is, of course, a definite need for tables. Nevertheless, the value of a rational selection method cannot be overlooked, particularly to the experienced engineer. The method described permits visual analysis. The use of this method or even the understanding of it should be helpful to those interested in the application of finned coils.

Picture Paragraphs

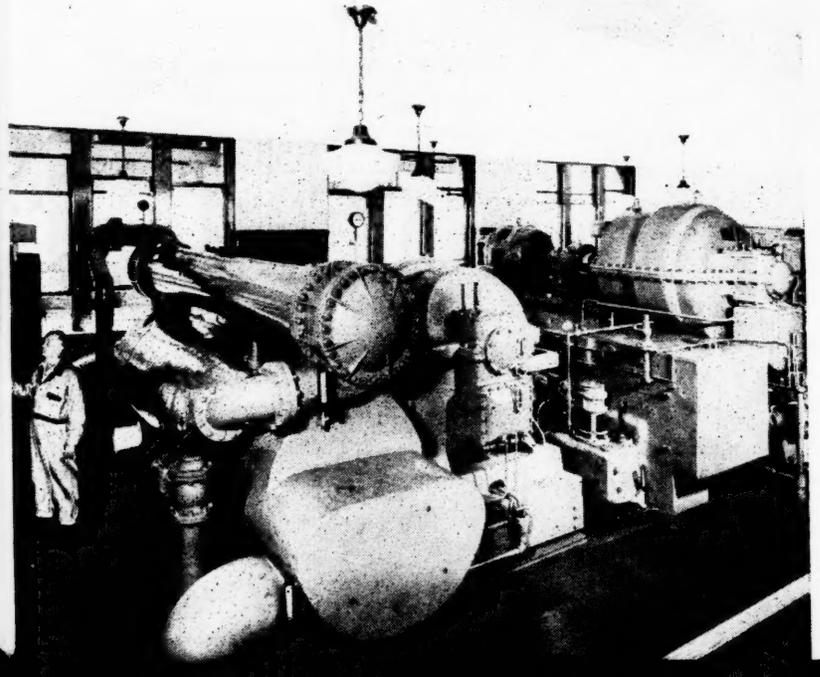
HEATING AND VENTILATING

(Above) **The world's first air conditioned trackless trolley made by Pullman put into operation recently in Atlanta, by Georgia Power Co. Cooling unit is installed on roof while refrigeration equipment is under floor. Carrier installation also includes heating equipment.**



(Left) **Two 8-ft fans with plastic blades double ventilating facilities of the famous old Hoosac Tunnel on Boston & Maine Railroad near North Adams, Mass. Fans can exhaust air at over 540,000 cfm replacing 250,000 cfm capacity of single paddle wheel fan installed nearly 50 years ago in America's first railroad tunnel.**

(Below) **Three centrifugal refrigerating compressors are in the paneled parlor at the big Carling's brewery in Cleveland where Brewing Corp. of America plans to double its capacity in what used to be the old Peerless automobile plant. Compressors supply 800 tons of refrigeration daily and occupy half of space where Peerless once had its headquarters sales office.**

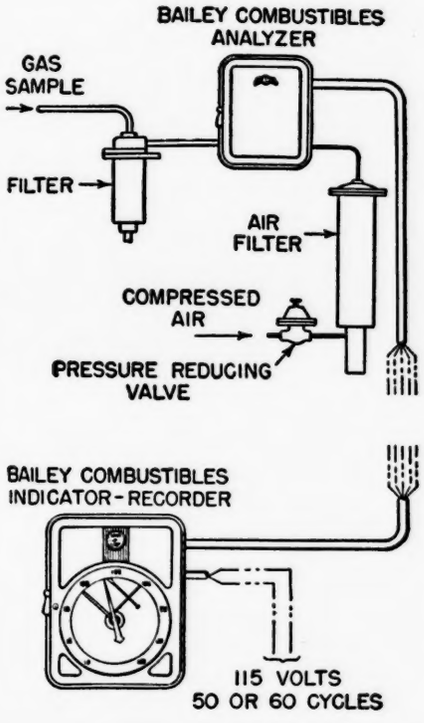


(Above) **Four H. B. Smith employees each of whom is 80 years old this year and does a full day's work every day at the Westfield, Mass. plant. Left to right these men are: John Sime, chief electrician, with Smith for 36 years; William H. Angell, patternmaker, 59 years' service; Edmund Kent, yard foreman, 56 years' service; and Edward L. Bosworth, machine shop, 65 years' uninterrupted service.**

NEWS OF EQUIPMENT AND MATERIALS

Combustibles Recorder

NAME — Combustibles recorder-controller.
PURPOSE—For indicating, recording, and controlling the combustibles content of a gaseous mixture.
FEATURES—Has been applied to control of furnace atmospheres and chemical processes. Provides a continuous, graphic analysis said to be responsive to changes of .05% combustibles. Sustained accuracy is said to be within .25%. A continuous gas sample is mixed with compressed



air and burned on a catalyst-filament which reaches a temperature proportional to the combustibles content. Since the filament resistance is proportional to the temperature, a simple resistance bridge connected to an electronic recorder completes the installation. It may be calibrated in % combustibles, mixture ratio, etc.
MADE BY—*Bailey Meter Co., Cleveland 10, Ohio.*

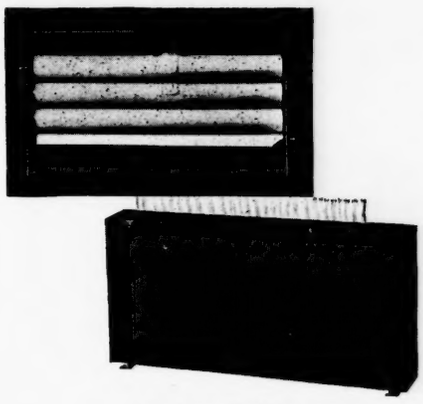
Steel Rivet

NAME—Rivnut.
PURPOSE—A tubular rivet which can be used as a blind rivet.
FEATURES—Originally made in aluminum for the airplane industry, Rivnut is now made in steel. It can be upset or headed from one side with a simple tool. The steel Rivnuts are made with various size threads, and special sizes can be ordered.
MADE BY—*The B. F. Goodrich Co., Akron, Ohio.*

Humidifier

NAME—Skillbeck home humidifier.
PURPOSE—An automatic humidifier for home and office.

With cover removed

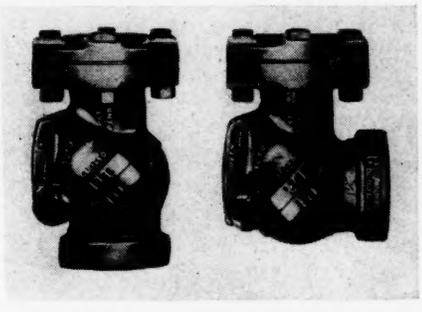


As installed in room.

FEATURES—Device operates off the hot water tank and is capable of serving an average 6-7 room house. Hot water is circulated through coils wrapped with absorbent material. The heated water evaporates quickly.
MADE BY—*Skillbeck Mfg. Co., Kenosha, Wis.*

Flow Control Valve

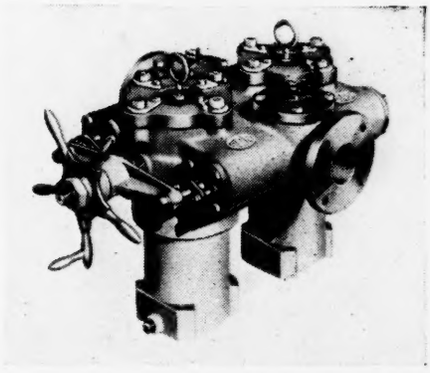
NAME—Universal flow control valve.
PURPOSE—To prevent gravity circulation of hot water in heating main when circulating pump is not in operation—a summer check when boiler is operating to supply service hot water.



FEATURES—This newly patented flow control valve is made up in two sections—flanged valve seat and cover casting—divided at a 45 degree angle so that sections may be assembled in line or at a 90 degree angle. Four socket-head cap screws seal the gasketed surfaces in either position. The valve mechanism is attached to an external control knob which allows the valve to be opened by hand when necessary.
MADE BY—*Triplex Heating Specialty Co., Peru, Ind.*

Pipeline Strainer

NAME—Duplex vertical chamber disc type pipeline strainer.
PURPOSE—Strainer designed to assure continuous flow in pipelines and to protect pumps and other equipment.
FEATURES—Large handwheel reverses valves simultaneously with minimum pressure drop. Eccentric position of the strainer basket with respect to the basket chamber is designed so



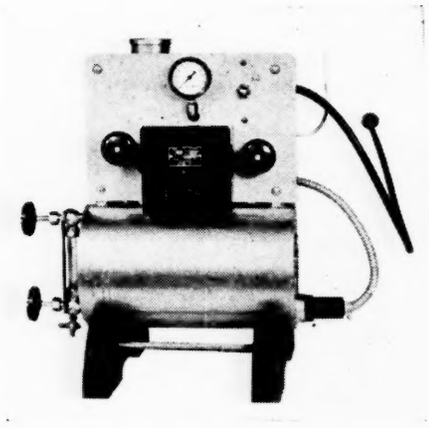
that the flow section is proportional to the flow needs at all points, thus reducing the pressure drop. Removable covers provide easy access to the basket chamber and permit easy and thorough cleaning. Large handholes above each valve assembly permit servicing of the valves without removing the strainer. Unit is made in cast bronze, steel, and iron.
MADE BY—*J. A. Zurn Mfg. Co., Erie, Pa.*

Handhole Seat Grinder

NAME—Automatic handhole seat grinder.
PURPOSE—For providing a means of controlled grinding so that handholes can be refaced for use in marine and stationary boiler rooms.
FEATURES—A grinding wheel is aligned with respect to the gasket seat by four screws in an adjusting plate. Assembly consists of the grinding wheel, a clevis arm, an adjusting plate, and a face plate that is screwed onto a manhole plate near the hole to be refaced. A feed screw controls the amount of grinding. Free movement of the spindle around the handhole is provided by the clevis arm. Any handhole within reach of the grinder can be ground from a single position of the face plate. The grinder is driven by a high speed compressed air motor. The grinding wheel is interchangeable with a wire brush for cleaning gasket seat surfaces that do not require refacing. Device then becomes a hand held cleaning tool.
MADE BY—*Elliott Co., Jeanette, Pa.*

Steam Heating Treatment

NAME—Pressure-jet.
PURPOSE—A method of cleaning steam heating systems at sections beyond the boiler.
FEATURES—Unit is connected to the header or steam main by means of a ⅛ in. copper tube at a point beyond the boiler. A treatment fluid



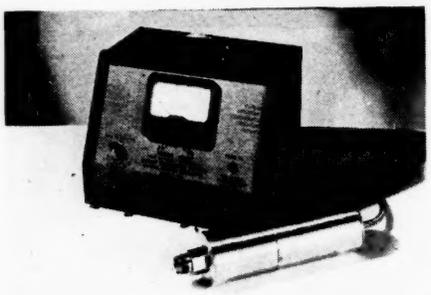
is discharged under high pressure through a small hole to atomize the liquid. Because the temperature of the atomized fluid is higher than the temperature of the steam into which it is injected, the fluid vaporizes and combines with the steam to be carried to all parts of the system. A liquid level switch automatically controls the current to the electric heater element. Rate of discharge is controlled by adjusting a needle valve. Desired pressure is maintained by a pressure control switch.
MADE BY—*Pressure-Jet Systems, Inc., 161 W. Wisconsin Ave., Milwaukee 3.*

Liquid Cooler

NAME—Niagara industrial liquid cooler.
PURPOSE—Cooling of water for air conditioning or water cooling jackets in industrial processes.
FEATURES—Cooling water is sprayed over banks of coils in which the refrigerant is expanded. Water falls into a tank and is recirculated. Newly developed coil arrangement and design increases capacity of new units of previous models by 50% or better. It is possible to produce 33F water without danger of freezing because of the very close control. For lower temperatures the coolers may be operated with Niagara No Frost liquid solution. All parts are accessible for cleaning and experience shows that coils stay clean if the tank is cleaned weekly.
SIZES AND CAPACITIES—Sizes are from 4.7 to 137 tons refrigeration. Model rated at 137 tons is 105 in. long by 88 in. high by 60 in. wide.
MADE BY—*Niagara Blower Co., 6 E. 45th St., New York 17, N. Y.*

Vacuum Gage

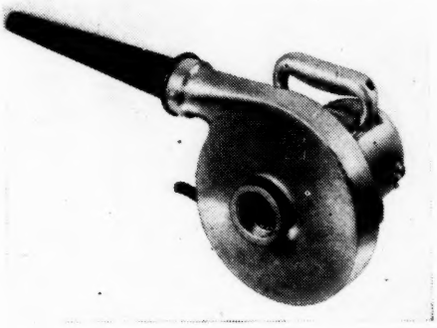
NAME—Alphatron vacuum gauge.
PURPOSE—To provide a sensitive instrument for measuring vacuum involving air and water vapor.
FEATURES—The ionization effect of emanations from a small, radium source is used in this instrument. For greater sensitivity at low pressures, a selector switch is turned. No calibration curves are required for different gases so that it is easy to measure gases other than air. It can be used to measure pressures of any mixture of two gases if the per-



centage composition of the mixture is known. As shipped from the factory, the Alphatron is calibrated for dry air. A cable connects the gauge to the control box.
MADE BY—*National Research Corp., Vacuum Engineering Division, Boston 15, Mass.*

Portable Blower

NAME—Ace portable electric blowers.
PURPOSE—For use where a powerful air blast is required for cleaning or for a paint spray.
FEATURES—Model A has a 1 hp motor which can operate at two speeds. At high speed it delivers 176 cfm at 48 in. wg pressure; at low speed, 125 cfm at 36 wg pressure. By means of attachments, it can be used for



spraying insecticides or for spray painting.
SIZES AND CAPACITIES—Besides Model A, there is Model B with 450 watt motor; Model C with 330 watt motor and Model D with 260 watt motor.
MADE BY—*The Ace Co., 12-40 N. Orange St., Ocala, Fla.*

Safety Vents

NAME—Safety vent with rupture diaphragm.
PURPOSE—Protection against explosion and fire for processing vessels containing inflammable liquids.
FEATURES—Device is a combination of vapor valve and rupture diaphragm. It has a special disc or rupture diaphragm that will break to relieve excessive pressures which build up within a storage tank. A specially designed unit with perforated brass flame barrier plates

permits the safe escape of inflammable gases, and prevents flames from flashing back through the perforated vent plates into the tank.

Safety vents are made in bronze, steel, semi-steel or cast iron, with flange or butt-weld connections, and in a wide range of sizes.
MADE BY—*J. A. Zurn Mfg. Co., Erie, Pa.*

Rubber Springs

NAME—Torsilastic rubber spring.
PURPOSE—A spring suspension type of mounting.
FEATURES—This type spring is of the torsion type having an inner shaft surrounded by annular layer of rubber and a metal shell around the outside. The parts of the spring are an inner shaft, outer shell, and a cylinder of rubber bonded to shaft and shell. This type spring eliminates bearings which would otherwise be necessary. It can be made into a small, light, inexpensive unit. It resists axial movement and tilt. The makers claim that the rubber torsion springs should be capable of many years use without any service other than a possible adjustment at long intervals. They are low in weight and low in noise level.
MADE BY—*B. F. Goodrich Co., Akron, Ohio.*

Pipe Coupling

NAME—Drinkwater Presto-Lock Coupling.
PURPOSE—To provide a flexible pipe coupling that can be easily and quickly assembled.
FEATURES—Couplings can be used with any plain end pipe without grooves, flanges or threads. It consists of two corrosion resistant malleable iron castings and a quick locking wedge key. Sizes 1¼ to 3 in. have a wedge key and chain assembly as illustrated while the larger sizes have two wedges without chains. Gaskets, molded to the castings, are made of synthetic or natural rubber. Makers claim that each

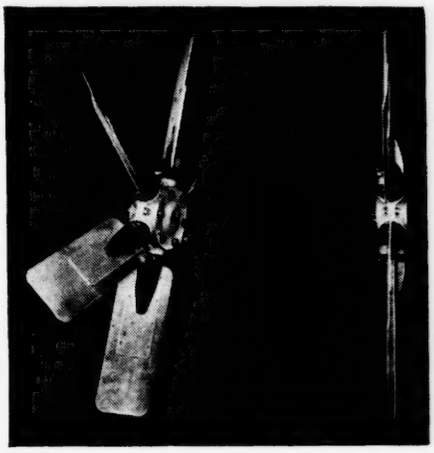
joint has as much as 40 deg. flexibility, and it can be used for repairing any size leak that the coupling will cover.
SIZES AND CAPACITIES—From 1¼ to 16 in. At present only 1¼, 1½, 2, 2½ and 3 in. sizes are available.
MADE BY—*Drinkwater, Inc., 2323 S. Michigan Ave., Chicago 16, Ill.*

Dial Thermometer

NAME—Bimetal element dial thermometer.
PURPOSE—Rugged, accurate instrument for the measurement of temperature.
FEATURES—Expansion of bimetallic coil rotates attached small shaft and indicating pointer. Instrument free from pivots, mechanical linkages or gears. Standard ranges are available between limits of —90F and 1000F. Temperature can be increased 50% beyond end of the scale range without damage for ranges up to 500F. Also made for high pressure type service.
SIZES—Made in 2, 3, and 6 in. dial.
MADE BY—*Equipoise Controls, 342 Madison Ave., New York 17, N. Y.*

Thermo Control Fan

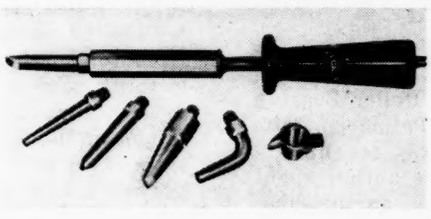
NAME—Evans thermo control fan.
PURPOSE—For improving the temperature of heavy-duty internal combustion engines.
FEATURES—The fan automatically adjusts itself to produce the best operating conditions by means of variable pitch of the fan blades. With



the engine at low load or on cold days, the fan blades may be at zero pitch or reverse pitch. A heavy duty Vernatherm automatically changes the pitch of the fan blades to the maximum that would be required under heavy loads or high ambient temperature.
MADE BY—*Evans Products Co., 15310 Fullerton Ave., Detroit 27, Mich.*

Soldering Iron

NAME—Kwikheat thermostatic soldering iron.
PURPOSE—To maintain constant heat during a soldering operation.
FEATURES—A 225-watt heating element is held in check by a thermostat. A built-in iron shaft maintains constant temperature and prevents overheating. There are six different



style tips that can be interchanged with all Kwikheat irons. The tips are of copper alloy and are screwed into the iron. One tip is an aluminum alloy melting pot for tinning. With a No. 1 tip, the iron weighs 14 oz. Length of iron with tip is 13 in.
MADE BY—*Sound Equipment Corp. of California, 3901 San Fernando Road, Glendale 4, Calif.*

Water Cooler

NAME—Coolstream electric water cooler.
PURPOSE—For the electric cooling of drinking water.
FEATURES—Both bubbler and bottle type Coolstream coolers are fabricated of stainless steel. They incorporate several new features including a one-piece cabinet, removable without tools, and a one-piece top

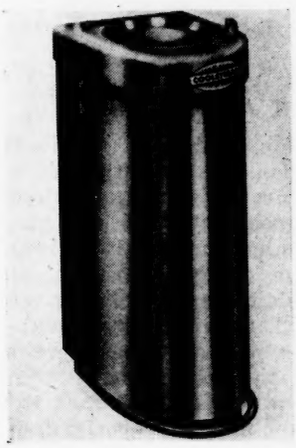
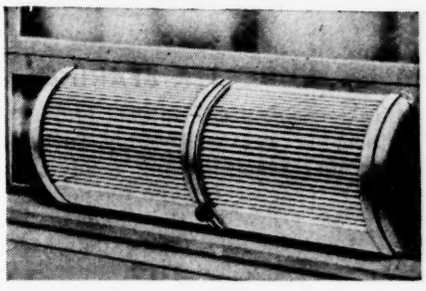


plate. They can be operated by foot pedal from the side or front and provide protection against contamination of the jet by the mouth. The makers say that Coolstream bottle type cooler is the first of its kind with a fully enclosed and refrigerated bottle.
MADE BY—*The Coolstream Corp., 55 W. 42nd St., New York 18, N. Y.*

Window Ventilator

NAME—Window power ventilator.
PURPOSE—To control air quality.
FEATURES—Twin blowers and motor are housed in a rotating cylinder which has a combination of entry and outlet ports. These ports are designed so that by simply turning a knob, the unit can deliver 100%



fresh air, partly recirculated air, completely recirculated air, or it can be used to exhaust the room air. Rheostat and motor switch are also attached to the lever which controls the various positions of the unit.
MADE BY—*U. S. Air Conditioning Corp., 2101 Kennedy St., N.E., Minneapolis, Minn.*

Abstracts AND Reviews

Books of other publishers reviewed in these columns may be purchased at list price through HEATING AND VENTILATING, *Book Department. Please enclose remittance with order. Other items, such as articles or pamphlets reviewed, should be obtained from original publishers whose street addresses are shown.*

VAPOR ADSORPTION

The physical and physico-chemical background of adsorption, the essentials of vapor and heat transfer and saturation of air are discussed by Edward Ledoux in his book, Vapor Adsorption.

The subject matter is divided into four parts—1, presentation of the subject of static adsorption; 2, the essentials of vapor and heat transfer and the saturation of air; 3, dynamic adsorption; and 4, some of the outstanding problems that were most successfully solved by data on adsorption.

Adsorption is a tool that is adaptable to many uses when applied in properly designed equipment. Those interested in the subject will find a correlation of theory and practice.

Vapor Adsorption by Edward Ledoux. Cloth bound, 5½ x 8½ in., 360 pages. Published by Chemical Publishing Co., Inc. Price, $8.50.

CABIN TEMPERATURE

In designing an airplane heating system, it is important to determine the flow rate of ventilating air through the heater, duct work and airplane. This air flow determines the duct design, duct air temperature, and the location and type of outlets. A method of determining this is presented by Myron Tribus and Avery Foote.

Calculations showing the relation between optimum air flow and air leakage for the heater used in the cargo compartment of a C-46 airplane are given in the article. As a result of the calculations given by the authors, it is noted that the resultant duct air temperatures are higher than those normally used in aircraft.

Effect of Ventilation Rate on Cabin Temperature, by Myron Tribus and Avery Foote. "Mechanical Engineering," Oct. 1945, pages 668-669.

BALL AND ROLLER BEARINGS

A text book on the subject of Ball and Roller Bearing Engineering was written by Dr. Arvid Palmgren, winner of many engineering academy awards for his research in bearing fatigue phenomena. The author spent nearly 30 years in the field of bearing engineering. When his book was translated into English, the translators decided to retain the metric system in his text.

Dr. Palmgren discusses radial and thrust bearings, forces and motions in bearings, theory and calculations on such subjects as the nature of rolling resistance, friction torque, friction coefficients, stresses and deformations, load distribution, motion and inertia. The book has chapters on carrying capacity of ball and roller bearings, bearing selection, design of bearing applications, mounting and dismounting, lubrication and maintenance, and bearing failures.

While the first copies were sent to schools, colleges, and libraries, later editions will be sold at cost by the publishers.

Ball and Roller Bearing Engineering by Arvid Palmgren. Cloth bound, 6¾ x 9¾ in., 270 pages. Published by SKF Industries, Inc., Front St. & Erie Ave., Philadelphia 34, Pa.

IN BRIEF

SPONTANEOUS HEATING OF COALS.—To store coal properly for indefinite periods, it is necessary to know something about its tendency to heat spontaneously in storage, according to the U. S. Bureau of Mines Technical Paper 681. This paper, entitled "Relative Spontaneous Heating Tendencies of Coal," by J. L. Elder, L. D. Schmidt, W. A. Steiner, and J. D. Davis, covers laboratory experiments on the tendencies of various types of coal to heat spontaneously. The procedure was to set up a calorimeter and induce and study actual heating under controlled conditions. Notable is the fact that measurements were taken while the atmosphere surrounding the coal sample was kept at an oxygen concentration of about 85% and a temperature at or above 140F. It was found that the spontaneous heating tendencies of coal increase as the rank of the coal decreases and as the temperature and available oxygen increase. Significant is the statement: "Whether or not a given coal pile heats spontaneously often depends more on storage conditions than on the properties of the coal in question." This paper is for sale at 10 cents by the Superintendent of Documents, U. S. Government Printing Office, Washington 5, D. C.

SBI RATING CODE—In September, 1943, an engineering committee was appointed by the board of directors of the Steel Boiler Institute and assigned the task of revising the rating code for residential steel boilers and the rating code for commercial steel heating boilers. These revised codes are included in the recently issued fourth edition of the SBI Rating Code for Steel Heating Boilers. The rating code for commercial steel boilers has been revised to specify minimum instead of average furnace heights, and these heights have been determined following conferences with the Stoker Manufacturers Association. The SBI code for residential steel boilers is completely new and includes standardized sizes for mechanically fired boilers, a new grate area formula, and furnace volume requirements for hand-fired boilers and a code for testing oil-fired boilers. Copies of the Rating Code are available at 50 cents each from Steel Boiler Institute, Inc., 366 Madison Ave., New York 17, N. Y.

ARC WELDING—As part of a series on Code of Minimum Requirements for Instruction of Welding Operators, the American Welding Society has issued an 83-page booklet on Part A—Arc Welding of Steel 3/16 to 3/4 in. thick. It was prepared by the Committee on Minimum Requirements of Instructions for Welding Operators in Trade Schools. It covers such topics as design of positioning equipment, design and use of testing apparatus, welding electrodes, and suggested exercises. Price, 50 cents. Copies may be obtained from American Welding Society, 33 W. 39th St., New York 18, N. Y.

NEWS OF THE MONTH

YARNALL NEW ASME PRESIDENT

Yarnall-Waring co-founder becomes president of mechanical engineers' society.

• **VALVE DESIGNER.**—D. Robert Yarnall, president and co-founder of Yarnall-Waring Co., has been elected president of The American Society of Mechanical Engineers. Nominated at the June meeting of the society, Mr. Yarnall was elected by letter ballot in September. This brings to the head of the mechanical engineers' society a man prominent in the field of steam valve design and manufacture.

For over forty years Mr. Yarnall's work at design and construction in conjunction with his business, has resulted in many patents on valves and steam specialties. These devices, manufactured by his company, are in use in practically every government controlled steam-operated ship, as well as in high-pressure steam-generating plants in the United States.

• **BIOGRAPHICAL.**—Mr. Yarnall was born June 28, 1878, in Delaware County, Pa., a son of Edward S. Yarnall, and of Sidney S. (Garrett) Yarnall, both of American Quaker ancestry. He attended Westtown School and the University of Pennsylvania, from where he was graduated in 1901 with the degree of bachelor of science in mechanical engineering. He received the further degree of mechanical engineer in 1905.

D. R. Yarnall

After college he went to work for the Coatesville Boiler Works and allied companies as an engineer and remained with them for five years. His next position was with Stokes and Smith Company, Philadelphia, in a similar capacity, with whom he also remained for five years. In 1912 he became vice-president and general manager of the Nelson Valve Company of Philadelphia and held this position until 1918. In 1908 with B. G. Waring, he organized the firm of Yarnall-Waring Company and has been continuously identified with that company to the present time. The company manufactures power-plant specialties. He is also a director and president of the James G. Biddle Company of Philadelphia, who are manufacturers of electrical instruments.

As the representative of the A.S.M.E. he served as director and chairman of the Committee on Public Affairs of the American Engineering Council. He has been a director and vice-president of the Engineering Foundation; member and fellow of The American Society of Mechanical Engineers, having served as one of its managers from 1917 to 1920; trustee of Franklin Institute; Engineers' Club of Philadelphia, of which he served as president for the term of 1929-1930; vice-president and director of the American Friends Service Committee; member of Sigma Xi fraternity. For eleven years he was Presiding Clerk of the Philadelphia Yearly Meeting of the Society of Friends; and is chairman of the board of directors of Pendle Hill.

Mr. Yarnall was elected on Nov. 1, 1937, president of the United Engineering Trustees—joint agency for the four Founder Societies of Civil, Mining and Metallurgical, Mechanical and Electrical Engineers.

In 1941 he was awarded the Hoover Medal by the A.S.M.E., and in the following year was made Doctor of Engineering by Lehigh University.

Mr. Yarnall served as a member of the commission in Europe having charge of feeding German children in 1920, being stationed there for about nine months, and during the latter part of his stay in Berlin served as chairman of that commission. In 1924 he was again sent to Germany under the auspices of the American Friends Service Committee and the General Allen Committee, having charge of the liquidation of the relief program. In June, 1938, he and Mrs. Yarnall were sent by American Friends Service Committee to Austria to assist in organization of relief of refugees. In 1941, he was a member of a commission to England to make a survey of relief needs due to war and to consult the British government about shipment of more food through the blockade for the aid of children and mothers of France. He was appointed a member of the City Planning Commission, Philadelphia, Pa., in 1942, and was reappointed in 1944 for a full term of five years.

ASHVE MEETS IN N. Y.

Annual Convention to be held at Commodore Hotel, New York City, Jan. 28-30.

• **CONVENTION SET.**—The 52nd Annual Meeting of the American Society of Heating and Ventilating Engineers will be held January 28-30, 1946, in New York City, with headquarters at the Hotel Commodore. Arrangements will be in charge of the New York chapter.

At the October council meeting it was decided to hold a business session on Monday, January 28, devoted to reports of officers, consideration of amendments to the society's charter, and recommendations for amendments to the constitution and by-laws. Technical sessions are scheduled for Tuesday and Wednesday, with the annual banquet on Tuesday evening, January 29. Program details will be published in the next issue.

• **NOMINEES.**—Those nominated for office are: President—Alfred J. Offner, consulting engineer, New York, N. Y.; first vice-president—Dr. B. M. Woods, Director of University Extension, University of California, Berkeley, Cal.; second vice-president—G. L. Tuve, Head, Department of Mechanical Engineering, Case School of Applied Science, Cleveland, Ohio; treasurer—J. F. Collins, Jr., secretary-treasurer, National District Heating Association, Pittsburgh, Pa.

Those nominated to serve as members of council for a three-year term are: Earl G. Carrier, Branch Manager, Carrier Corp., Boston, Mass.; F. W. Hutchinson, Professor of Mechanical Engineering, Purdue University, Lafayette, Ind.; R. A. Sherman, Supervisor, Fuels Division, Battelle Memorial Institute, Columbus, Ohio; and M. S. Wunderlich, General Sales Manager, Insulite Division, Minnesota and Ontario Paper Co., Minneapolis, Minn.

Members nominated to serve for a three-year term on the Committee on Research are: L. N. Hunter, vice-president, National Radiator Co., Johnstown, Pa.; C. O. Mackey, Professor of Heat-Power Engineering, Cornell University, Ithaca, N. Y.; R. D. Madison, Research Engineer, Buffalo Forge Co., Buffalo, N. Y.; L. G. Miller, Head, Mechanical Engineering Dept., Michigan State College, East Lansing, Mich.; and L. P. Saunders, Chief Engineer, Research Engineering, Harrison Radiator Division, General Motors Corp.

CONSTRUCTION LOOKS AHEAD

Material, price, and legislation problems loom as volume mounts.

• **MATERIALS.**—The nation's $7 billion building program for 1946 will probably get off to a fast start next spring if producers and dealers take full advantage of the winter lull to step up production and distribution of construction materials in anticipation of the heavy demand, according to John L. Haynes, Chief of the newly organized Construction Division, U. S. Department of Commerce.

Of the primary construction materials only lumber, brick, clay sewer pipe and cast iron soil pipe are in such tight supply that they may conceivably impede construction during the fall and winter, Mr. Haynes stated. However, the real threat is that if these basic materials are not more abundant by spring new construction will be faced with costly delays or builders may have to continue the use of techniques and substitute materials which had such wide application during the war.

Mr. Haynes said that of the secondary construction products which are now in short supply, only the production of bathtubs is likely to give serious concern in the next few months. The production rate of cast iron bathtubs may reach 80,000 per quarter by the end of the year, but this output will have to be supplemented by increases in the manufacture of deep drawn steel tubs, i.e. by formed ware, if the estimated requirements for 1946 of at least 450,000 housing units are to be met.

Despite military cut-backs, lumber stocks in mills and concentration yards are still very low, and for this reason lumber is still on the critical list, although it is hard to see how the shortage can continue if lumber production is maintained at the present rate of 2.5 billion board feet per month.

The current supply of unglazed brick, common and face, is improving, due in part at least to OPA action in granting a price increase of $2 a thousand to producers East of the Rockies. But the 1946 supply may be 30 per cent short of demand unless the industry can recruit sufficient labor to step up production.

Clay sewer pipe producers are negotiating for an increase in ceiling prices to enable them to pay higher wages and compete for manpower. Ceiling price increases of $2 a ton for cast iron soil pipe have already been granted and should accelerate production of this item so important in the early stages of construction.

• **PRICES.**—The Office of Price Administration's proposal to set a price ceiling on every new house was termed unworkable, dangerous, and unnecessary by Douglas Whitlock, construction industry spokesman. At the same time he stated that the industry is not now asking for the removal of price ceilings from construction materials and equipment, providing the pricing program is administered realistically and flexibly to ensure an adequate supply.

Mr. Whitlock testified before the Stewart subcommittee of the Senate small business committee, speaking in behalf of both the Chamber of Commerce of the United States and the Producers' Council, a national organization of manufacturers of building materials and equipment.

The witness stated that the importance of getting a large building program under way promptly is universally recognized, as is the fact that runaway prices would make the attainment of this goal impossible. But to attempt to set price ceilings on individual homes would, he predicted, be fatally hampering to construction activity, particularly among the small builders who play so important a part in residential construction.

"If anyone seriously contends that such a plan is workable," said Mr. Whitlock, "let him explain where he would find within the federal government an organization large enough and sufficiently experienced to undertake such a tremendous job.

"Where would the OPA, or any other government agency, find enough competent individuals to establish individual ceiling prices for even a half million homes? Think of the careful, painstaking study that would have to be devoted to each individual set of plans before a fair and equitable price could be set! Think of the time that would be required to ascertain the relative efficiency of each builder's own particular organization. Think what would happen, once a ceiling price had been established, if it were found necessary to grant higher prices for one or two or more of the major materials utilized, or if increased wage rates went into effect after construction had been started."

Aside from the impracticability of the plan, the witness continued, it would lead to a vicious black market, would tend to eliminate the smaller builder, and would lead directly to jerry building and a lower quality of construction because the builder, in the face of a fixed selling price and uncertain costs, would be compelled to cut corners wherever possible.

Finally, this unworkable and dangerous method of control is unnecessary, Mr. Whitlock stated, because competition among the thousands of builders and contractor within the industry and the common sense of the home-buying public will effectively prevent unduly high prices. The great bulk of the demand, he reminded the committee, is for small homes selling for less than $6,000. Any appreciable increase in the price of this class of building would automatically remove a large proportion of the prospective buyers from the market. "We are sincerely convinced," the witness concluded, "that the only practical way to avert inflation in housing is to encourage as many builders as possible to build new homes as fast as possible, thus increasing the supply of dwellings in relation to the demand."

• **BOWLES SPEAKS.**—There may be occasion to remember this declaration by Chester Bowles, OPA Administrator, speaking before the National Industrial Conference Board in New York: ". . . too many business men fail to understand the pricing principles upon which we operate. I am amazed to find some who are still unaware of our basic pricing standard which guarantees each industry price ceilings high enough to at least achieve their average peace time profits. With our present shortage of goods in most fields that actually constitutes a floor under profits.

"Many businessmen, moreover, feel that we are completely rigid and unrelenting. Once we fix a policy, they believe that it will never be changed. That is a wholly wrong conception.

"On the contrary our pricing standards and procedures are constantly under review. We have changed them promptly and we will change them again when conditions indicate the need. This principle of flexibility to meet the problems of production is clearly laid down in President Truman's executive order."

• **HOUSING.**—"Clearly the heart of our long range housing problem," says John D. Blandford, National Housing Agency Administrator, "is the spread which has existed and still exists between the price which American families can afford to pay for decent shelter and the price at which decent shelter, whether new or used, can be profitably rented or sold on the basis of existing construction costs and financing methods.

"It is this gap which has barred millions of otherwise self-supporting American families from a decent living. It is this gap which in the past has in effect led inevitably to the continued use of slums and shacks. And it is this gap which has limited the new housing market to only a fraction of what we will need to support an

economy of full production and full employment from here on out."

• **FHA REVIVED.**—Pre-war financing facilities under the FHA program are again available to the millions of home owners who postponed repair, improvement or modernization of their properties because of wartime restrictions, Commissioner Raymond M. Foley of the Federal Housing Administration pointed out last month.

All restrictions on loans for repairs and improvements were removed and all limitations on the use of materials for such purposes were lifted on October 15.

This means, Mr. Foley declared, that 4,500 qualified lending institutions throughout the country, can resume making loans under the peacetime regulations of FHA's Title I operations. Such loans may be for maximum amounts of $2,500 and run for a maximum term of three years, repayable in monthly installments.

• **VOLUME.**—Construction volume in the thirty-seven states east of the Rocky Mountains continued to mount in September. Outlays for construction involved in contracts awarded during the month were 5 per cent above August and 58 per cent above September of last year, according to tabulations of individual project contracts reported today by F. W. Dodge Corp. The total valuation of September contracts was $278,262,000.

Nonresidential construction featured the month's activity, with substantial gains over the previous month and over the corresponding month of last year. Ninety-five per cent of the nonresidential awards were for private accounts, only $8,511,000 of a total of $181,033,000 being classified as publicly-owned. The September record for private nonresidential construction continued to sharpen the trend from publicly owned projects characteristic of the war years, a spokesman for the Dodge corporation said. The record for the first nine months of this year shows 57 per cent of all nonresidential construction was for private accounts compared with only 25 per cent during the corresponding period of 1945.

Residential construction in September continued at the August level with a total of $42,580,000. This volume was 74 per cent above that reported for September 1944.

The dollar volume of all construction for the first nine months totaled $2,281,960,000, a gain of 52 per cent over the corresponding period of last year.

• **A BILL.**—Senator James E. Murray (D. Montana), introduced in the Senate on October 2 a bill (S. 1449) to aid in the stabilization of construction by advance planning of public works, to be called the "Construction Stabilization Act of 1945."

L. C. Hart, president of the Producers' Council, national organization of building product manufacturers, has endorsed Senator Murray's proposal for the advance planning of a $5 billion reserve of state and local public works to be used in stabilizing the future volume of construction, but urged that the program be limited strictly to useful and essential projects.

"Careful timing and scheduling of public works, for which the Murray bill provides, will do much to stabilize the construction industry and to eliminate extreme fluctuations in employment for workers in the building trades." Hart said. "In addition, public projects usually cost less if started when the demand for private construction does not require substantially all construction manpower and materials."

• **A JOB.**—Asserting that the construction industry also has a public relations job to do, H. A. Dick, president of the Associated General Contractors of America, told a meeting of the building Industry Conference Board in San Francisco, Calif., that with the lifting of restrictions on construction the industry is confronted with the task of explaining to the public that the unprecedented demand for new construction cannot be satisfied immediately, "any more than that a new automobile can be placed in every showroom tomorrow for every person who wants to buy one."

"The industry can, and undoubtedly will, execute a large volume of work during the coming year," he stated. "The A. G. C. has voiced the objective of construction operating at the rate of $12,000,000,000 annually.

• **N. Y. BOOM.**—Predicting a construction boom for Metropolitan New York that will dwarf the all-time high of $1,000,000,000 attained in 1926, building authorities warned of the danger of inflationary building prices and a "runaway" boom that would be detrimental to the long-term interests of the city.

The speakers, Thomas S. Holden, President of F. W. Dodge Corp., Alfred Rheinstein, President of the Rheinstein Construction Co., and Howard McSpedon, President of the Building and Construction Trades Council, discussed "New York's Construction Outlook" on the weekly radio business forum presented by the Commerce and Industry Association of New York, Inc. Neal Dow Becker, past president of the association, was moderator.

"For the area comprised by the five boroughs of New York City plus the metropolitan counties of New York State as far north as Newburgh," said Mr. Holden, "F. W. Dodge Corporation has reported private postwar projects in the design stage amounting to $797,000,000. This figure, including specific new projects only, is vastly greater than the contract total for all private plus public construction in the area executed within any one of the past fifteen years. The figure is more than 15 times as large as the total 1944 contract volume for the area. In most urban centers, including New York, the total of urgent private construction needs appears to exceed the 1946 capacity of the construction industry. Consequently, efforts to rush public projects on a large scale would tend to overload the industry and to create a strong pressure toward further inflation of construction costs."

Mr. Rheinstein warned that, "the most obvious and greatest danger of a boom is inflation. The stage is set," he said, "for speculators to exploit scarcity, for labor to demand high wages, for combinations of manufacturers and groups of subcontractors to 'jack up' a floor under prices. Abnormally high prices would defer much substantial long range work and put a premium on temporary expedients promising immediate profits."

Immediate revival of house-building, Mr. Holden said, may be held up because, "rental housing still is handicapped by a special obstruction—rent ceilings. A number of important investors are ready to start new rental projects, but they say they cannot risk their own money or secure adequate loans, during this period of increased construction costs, unless OPA will exempt new rental housing from rent ceilings."

CLEVELAND ASHVE CONFERENCE

Northern Ohio Chapter Host to Society at October Meeting.

• **ANNUAL SHOW.**—Starting in 1947, the International Heating and Ventilating Exposition will be held annually. This was announced at the fall meeting of the ASHVE council held at the Hotel Statler, Cleveland, October 7. The council also decided on revisions of the society's charter and upon the budget for the coming fiscal year.

• **3-DAY MEETING.**—The conference was part of a three-day meeting which was held October 6-8, and included an inspection of the society's research laboratory, and the October meeting of the Northern Ohio chapter.

• **CHAPTER PROGRAM.**—At the afternoon meeting of

the chapter on October 8 in the Hotel Statler, the following papers were presented:

Relation of the Ventilation Engineer to Industrial Hygiene, by H. G. Dyktor, Chief, Bureau of Industrial Hygiene, Division of Health, City of Cleveland.

A New Friction Chart for Round Ducts, by D. K. Wright, Jr., Assistant Professor Case School of Applied Science.

Transmission of Solar Radiation Through Flat Glass Under Summer Conditions, by George V. Parmelee, Research Fellow, ASHVE Research Laboratory, Cleveland.

At the dinner meeting, the visitors were welcomed by Prof. Priester, president of the Northern Ohio chapter. L. T. Avery, member of council, served as toastmaster. He introduced Dr. C.-E. A. Winslow, president of the society who spoke on the Air Cooled Human Body.

DRY AIR PRESERVES FLEET

Cruiser USS Brooklyn goes into dehumidified preservation as pilot ship of U. S. reserve fleet.

• **DEHYDRATED SHIPS.**—The Navy's "Keep the Fleet" program, designed to preserve America's present sea power in readiness for future emergency action, got under way officially when the 10,000-ton cruiser, *USS Brooklyn*, scientifically protected against deterioration, became the "pilot ship" of a peacetime reserve fleet that will number hundreds of efficient fighting ships.

New developments in dehydration and precise automatic instrumentation for controlling and recording humidity, now make it possible for the Navy to preserve a reserve fleet for 20 years or longer and with economy and efficiency never before achieved, it was explained by Captain H. Gordon Donald, now Demobilization Officer of the Navy Bureau of Ships.

"The Navy's prime considerations in the reserve fleet program," Captain Donald said, "are to safeguard these vessels against deterioration at a minimum cost in materials and manpower required for maintenance and inspection; and to insure that they can be speedily returned to active service, if the need arises, in a matter of days instead of months."

• **BONE DRY.**—The ideal of "bone dry" air to protect materials from deterioration resulting from corrosion, mold, mildew, tarnish and other effects of humidity or moisture in the air has been a long-sought goal of air-conditioning scientists and engineers.

It has not yet been achieved—this perfect and perpetual "Sahara of air"—but recent progress in the field of "dehumidification"—the "dehydration" of air—is now playing an important part in plans for the economic and efficient preservation of America's sea power.

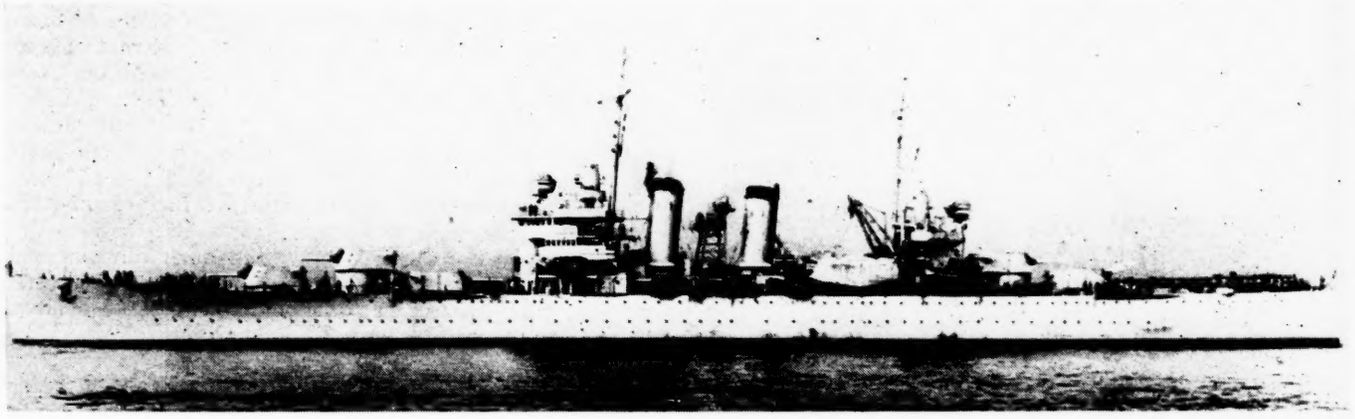
At the close of the first World War no adequate scientific equipment existed for protection of ships and their equipment and cargoes against the inevitable onslaught of humidity.

Shelter alone was not enough to prevent the water vapor in the air from seeping into the holds of ships to corrode metal surfaces, tarnish moving parts and "bright work."

• **GREASE INEFFICIENT.** — Grease, liberally smeared over engines, exposed metal surfaces and ordnance equipment was generally employed as a major preventative of corrosion and rust. As a result of this liberal use of heavy grease, the job of preparing an inactive naval vessel for return to active status was a long and costly one, involving many thousands of man-hours spent mainly in removing the grease, and replacing deteriorated equipment.

Major problems in the recording and control of humidity, cause of most deterioration in vessels and their equipment and stores, had to be solved in planning modern ship preservation measures which the Navy is now taking, it was explained.

• **RESEARCH.**—After more than 20 years of research and joint tests with leading firms manufacturing dehumidification equipment, the Navy had developed a number of systems for "dehumidifying" or drying the air in enclosed spaces aboard ship, Captain Donald said.



U.S.S. Brooklyn—Official U. S. Navy Photo.

The Navy now is able to put into effect preservation measures which will economically maintain hundreds of ships in a "reserve fleet" that will be in a constant state of readiness for emergency action over a long period of years, perhaps 20 or longer.

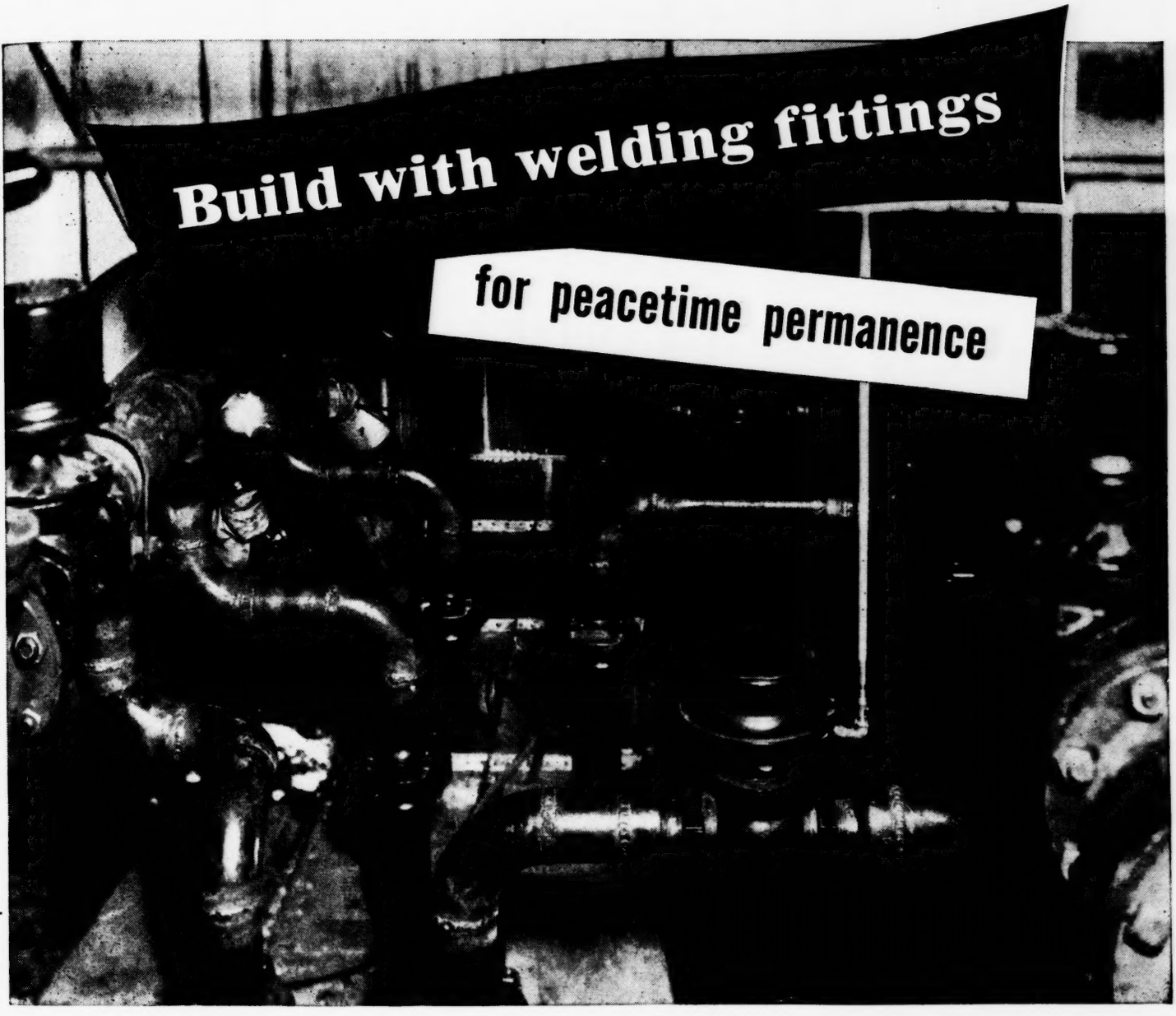
Preservation by dehumidification means removal of moisture from the atmosphere. This is done by two methods: dynamic dehumidification, which employs machines to remove water vapor; and static dehumidification, which employs desiccants such as silica gel to take up moisture.

Both methods have been tested and found effective by the Navy.

To insure that humidity in ships would remain below a constant "safe" level of 30 per cent, an accurate controller-recorder was needed.

A solution came from a division of Bendix Aviation in Baltimore, which developed a robot humidity-detective in joint research with Navy air-conditioning engineers. This device is a controller-recorder which records humidity changes from remote locations and transmits them in easily read numerals on a tape, to a central station, it was explained.

• **MECHANICAL BRAIN.**—In addition to taking continuous humidity and temperature readings at various single stations, the central recorder automatically computes the average relative humidity throughout the en-



LONG life, low overhead, satisfaction reaching far into the future—these are the considerations once again governing the planning of piping systems for peacetime permanence. In oil refineries and food-processing plants, among equipment manufacturers and utility engineers, Tube-Turn welding fittings meet these demands.

Such an installation as this would be impossible with screwed or flanged fittings, but the compactness and simplicity of Tube-Turn elbows fit the situation easily. Their strength, weight-saving, and ease of insulation offer added reasons for specifying Tube-Turn welding fittings.

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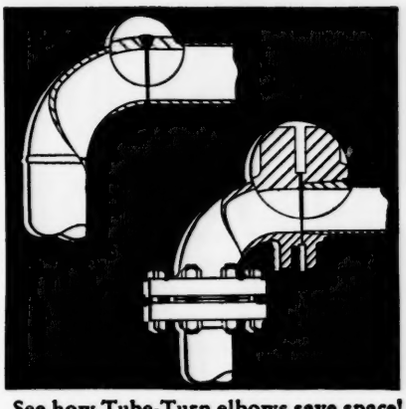


See how Tube-Turn elbows save space! No leaks, gasket changes or bolt-tightening to worry about—maintenance and replacement troubles are avoided.

TUBE-TURN TRADE MARK *Welding Fittings and Flanges*

tire ship. If the relative humidity climbs above 30 per cent, the recorder then becomes a controller which automatically regulates operation of dehumidification equipment.

"Relative humidity within the sealed spaces of a preserved vessel must be kept down below 30 per cent," Captain Donald explained, "in order to maintain a proper dry-air condition and prevent corrosion, tarnish, mildew, mold and rot. The all-important job of regulating the right relative humidity levels will be done by the automatic controller-recorder."

The principal work done to prepare reserve ships for preservation is done by ships' forces, he emphasized. Aboard the *Brooklyn*, which is serving as a model for the "dehumidification and preservation" program, crew members, for example, have completed such jobs as coating engines and "bright work" with chemical preservatives, storing light ordnance and other portable equipment in sealed moisture-tight spaces below decks, and installing dehumidification equipment.

Once the preparatory jobs are done, the ensuing costs of maintenance and inspection will be comparatively minor, because of the automatic operation of recording and controlling equipment, it was stated.

CRAWFORD HEADS ICI

New president sounds optimistic note for home heating and air conditioning.

• **ELECTED.**—At the 2nd annual meeting of the Indoor Climate Institute recently held at the Book-Cadillac in Detroit, T. A. Crawford, general manager of Timken Silent Automatic Division, Timken-Detroit Axle Co., was elected president succeeding Paul B. Zimmerman, who has held the office since inception of the Institute. L. N. Hunter of The National Radiator Co. was made 1st vice-president; R. E. Moore of Bell & Gossett Co. and E. N. McDonnell of McDonnell and Miller, were re-elected secretary and treasurer, respectively.

"America is on the threshold of the greatest home-building and modernization era in the history of the country," stated Mr. Crawford. "The heating and air conditioning industries will be called upon to introduce into American homes the full benefit of a wide range of equipment, which will raise the standard of living through technological developments. The Indoor Climate Institute for the past three years has been analyzing the many phases of the related industries which contribute to controlled indoor climate.

T. A. Crawford

It is a startling fact that 9 out of 10 homes in the United States are without automatic heating, in fact, nearly half of the homes, or 19 million, are using stoves!

• **CAMPAIGN.**—As the first step in its fundamental purpose of providing the public with unprejudiced information on the subject of heating and cooling for the home, the institute has issued a consumer booklet dealing with central heating systems of all types burning gas, oil or coal. The booklet will contain the best thinking of the various trade associations composing the heating industry and will be distributed nationally by the institute and its membership.

It is reported that Indoor Climate Institute will, in the near future, also take under consideration the development of a national advertising campaign and promotional activities which will focus the attention of the public and all allied groups in the building industry upon the vital subject of greater indoor comfort and health through adequate, properly installed, automatically-fired central heating systems in the home.

• **DIRECTORS.**—At the annual meeting the following representative cross-section of the leaders in the allied heating and cooling industries were elected to the board of directors: Paul K. Addams, Fitzgibbons Boiler Co., Inc.; A. T. Atwill, Quaker Mfg. Co.; C. T. Burg, Iron Fireman Mfg. Co.; Thomas Byrd, The Lau Blower Co.; R. C. Cameron, Chrysler Corp., Airtemp Division; Bruce T. Cunningham, Research Products Corp.; J. K. Knighton, Servel, Inc.; C. E. Lewis, Perfex Corp.; C. D. Lyford, Minneapolis-Honeywell Regulator Co.; J. M. McClintock, Freeman Stoker Division, Illinois Iron & Bolt Co.; J. P. McIlhenny, Air Conditioning Department, General Electric Co.; Joseph R. Murphy, Taco Heaters, Inc.; C. A. Olsen, The C. A. Olsen Mfg. Co.; Gordon Rieley, The Bryant Heater Co.; Jack Searls, White-Rodgers Electric Co.; and Martin Weil, Weil-McLain Co.

WEST COAST COMMENT

Heating, ventilating, and air conditioning industries show activity on Pacific coast.

• **ANDERSON.**—The heating, ventilating and air conditioning industry will share in a postwar construction program in the Los Angeles area involving over 200 million dollars worth of new building and remodeling work, Earl S. Anderson, manager, Los Angeles Chamber of Commerce Convention Bureau, declared in a recent talk before the Southern California Chapter, ASHVE.

Mr. Anderson, who as manager of the chamber's construction industries department during the war was in close contact with construction plans of the area, discussed "Prospects Relating to the Heating, Ventilating and Air Conditioning Industry."

He pointed out that activity in that industry is intimately and inevitably linked with construction activity. When heavy construction rises to a high volume, Mr. Anderson emphasized, the heating and ventilating industry's overall volume rises proportionately.

If the estimated total of projected new construction in Los Angeles County is used as the measuring stick, Mr. Anderson asserted, the heating, ventilating and air conditioning industry of Southern California is faced with one of the busiest periods in its history during the next five years.

Data compiled by the Chamber of Commerce, Mr. Anderson declared, indicates that a potential volume of approximately 25 million dollars worth of work is in store for the Los Angeles County heating, ventilating and air conditioning industry in the immediate postwar years.

• **HOMES.**—He cited another field of construction in which the heating and air conditioning industry will share. This is in the home construction field. Mr. Anderson predicted that 50,000 new residential units per year will be constructed by private home builders during the next five years in Los Angeles alone, this volume representing about 40% of the total construction figure,

"Home air conditioning is on the upgrade," Mr. Anderson said. "Surveys made by manufacturers, associations and others have indicated a growing demand on the part of homeowners and prospective new-home planners for year-round air conditioning that will permit control of the air in their homes in summer as well as in winter."

Listen to the Human Adventure on the Mutual Network every Sunday evening, 9 to 9:30 P. M., Eastern Time.

The green light in metals... Revere has them NOW

Revere knows well how precious to the nation each of these post-war days can be, and how crippling to industry and employment could be a shortage of essential metals. That is why, since V-J Day, Revere has been in full production for peace.

Fortunately, Revere metals can serve the needs of creating as well as those of destroying, can make as fine bathroom fixtures as bomb fuses, as excellent radiators for automobiles as for half-tracks. No difficult reconversion problems have stifled the outpouring of Revere metals.

Revere copper, brass, bronze, aluminum, magnesium, steel, are ready *now*, are already busy in thousands of plants helping shorten the period of reconversion for industry and for the nation.

We are able and eager to do more. One inevitable result of Revere's war effort has been that not only our ability to produce, but our ability to give service, have been expanded many times. Revere research has probed further and deeper. Revere Technical Advisors are armed with greater knowledge and experience. New methods, metals and machines may save precious time or cut all-important cost for users of our metals.

In all these ways Revere is ready *now* to serve the manufacturing and building industries to help you prove *immediately* that America is even greater in peace than she proved to be in war. In the same way Revere is ready to serve home owners with its building products which are stocked by Revere Distributors in all parts of the country.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

Executive Offices: 230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y.

Sales Offices in principal cities, Distributors everywhere

Revere District Sales Offices are located in the following cities:

Atlanta, Ga.	Boston, Mass.	Buffalo, N. Y.
Cincinnati, O.	Cleveland, O.	Dallas, Texas
Dayton, O.	Grand Rapids, Mich.	Hartford, Conn.
Houston, Texas	Indianapolis, Ind.	Los Angeles, Calif.
Milwaukee, Wis.	Minneapolis, Minn.	New York, N. Y.
Philadelphia, Pa.	Pittsburgh, Pa.	Providence, R. I.
St. Louis, Mo.	San Francisco, Calif.	Seattle, Wash.

The Revere Office nearest you is at your service.

• **HELPS.**—Mr. Anderson also presented an outline of the program the Chamber of Commerce has drafted to lend assistance and collaboration to the heating and ventilating industry in trade development in Los Angeles city and county. He explained the purpose and functioning of the business service, construction, industrial, research and other departments operated by the chamber, and the industrial development, manufacturing, and other committees to whose services the heating and ventilating industry representatives are welcome, he said.

• **GEYER.**—H. W. Geyer, utilization engineer, Southern Counties Gas Co., Los Angeles, delivered a talk on testing and approving of gas water heaters at the 16th annual convention of the Pacific Coast Plumbing Officials Association at Los Angeles.

Mr. Geyer defined the meaning and purposes of the American Gas Association approval committee and the function of the AGA's testing laboratories in Cleveland, Ohio, and Los Angeles, Calif.

The administrative officials of many cities which recognize AGA-approved standards for water heaters as well as heating systems, Mr. Geyer declared, do not realize the full background of work involved in the determination of standards for such equipment. The AGA approval committee, he explained, includes among its membership representatives of leading heating, plumbing and air conditioning associations and societies, heating and ventilating engineers and appliance authorities. This arrangement, he pointed out, gives plumbing and heating industry members a direct voice in heater and water heater approval.

• **AGA TESTS.**—A water heater is subjected to some 300 different tests and checks, he pointed out. Only 2% of all appliances pass the AGA approval test the first time.

To the plumbing officials, Mr. Geyer said, AGA approval of water heaters and heating system equipment means that all technical and construction work involved in the units has been checked and approved, leaving to the municipal inspectors only the task of assuring that the installation is properly made.

• **SMOKE.**—After months of study, the Los Angeles County Board of Supervisors early in October adopted two measures designed to cover the legal phases of a two-year battle to eliminate excessive air pollution in unincorporated areas of the county.

One measure makes it unlawful for anyone from any source to permit smoke and fumes to escape into the air in greater than prescribed densities charted by a committee of experts. This measure, in the form of a county ordinance, defines violations as a misdemeanor punishable by a $500 fine, six months in jail, or both.

The second measure is in the form of an amendment to the county building and safety code, and regulates smoke volume from future installations of boilers, burners and smokestacks in industrial plants, but does not apply to heating equipment now installed. The same fines and jail terms as above apply.

Enforcement of the new measures was delegated to the sheriff's office and the office of county smoke abatement.

• **PARALLEL.**—The city of Los Angeles took parallel action when its city council in mid-October ordered drafted an emergency municipal ordinance to outlaw noxious smoke and fumes. This action was taken upon the conclusion of a series of conferences between city officials and Dr. Robert A. Milliken and Dr. E. H. Swift of the California Institute of Technology.

The council also appropriated $12,000 to create an air purity division in the city health department for the purpose of ending air pollution and enforcing the proposed ordinance.

Led by the Pasadena Board of City Directors, who recommended State legislation against excessive dissemination of smoke and fumes from industrial plants, five other cities of Los Angeles County adopted resolutions urging uniformity of legislation to curb the air pollution evil.

• **NEW TESTING LAB.**—Pipe sizes up to 10 inches in diameter can be tested in the new hydraulic testing laboratory which was opened recently for a shake-down run in the engineering building, University of California, Los Angeles.

In the realm of pipe testing equipment, water pump and vaccum pull testing the new laboratory is regarded as the most completely equipped of its kind in the world and can conduct tests on piping of any size up to and including ten inches. Facilities now installed include equipment for testing water pumps up to 3,000 gpm and vacuum pump pull to 1,750 cfm.

The main laboratory, including equipment and cost of remodeling the engineering building, was paid for with $30,000 of a $75,000 endowment fund, which was contributed to the Research Foundation which controls the laboratory, by heating and air conditioning contractors, plumbing contractors, associations of such operators, manufacturers and distributors of heating and plumbing equipment and pipe.

The laboratory is controlled by the Research Foundation under the supervision of the trustees and officers of the university. Non-profit in character, the foundation is reported to be free from the control of any trade group or industry.

Plans are now under way for drawing up rules and regulations whereby manufacturers may be guided in the design of new devices to assure they will meet laboratory specifications. Tests will be made for manufacturers, designers and municipalities.

ULTRA-VIOLET TO CURB DISEASE

Pleasantville, N. Y. is test community in effort to curb airborne infections.

• **COOPERATIVE EFFORT**—The first community-wide test in the nation of the use of ultra-violet rays to disinfect air inhaled by school children will be undertaken beginning January 1 in Pleasantville, N. Y., according to an announcement by Dr. William A. Holla, Westchester County Health Commissioner.

The tests will be sponsored by the County Health Department, Milbank Memorial Fund of New York, the University of Pennsylvania's School of Medicine, and the General Electric Co. and are intended to curb germs that cause measles, mumps, chicken pox, virus pneumonia, and the common cold.

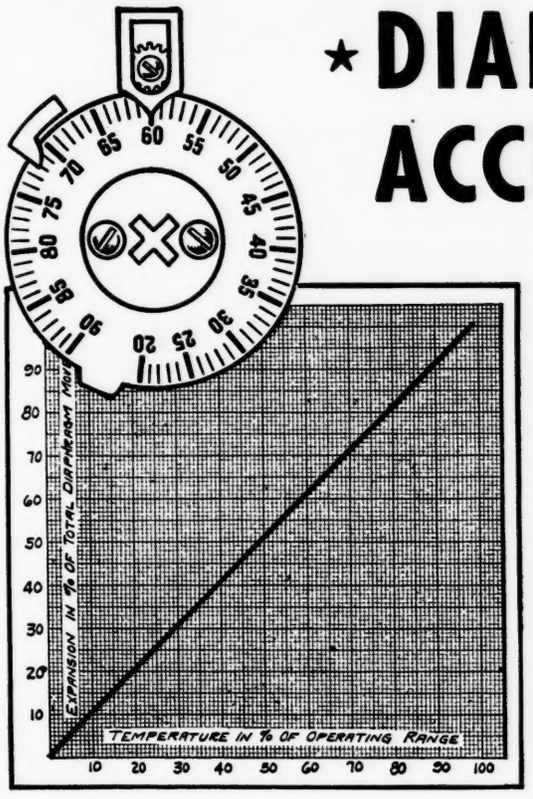
• **THOROUGH.**—For three years, Dr. Holla said, ultra-violet lamps will be used in all classrooms of the grammar and high schools of the town, and tentative arrangements have been made to install similar lamps in the motion picture theater, six churches, and other buildings where children congregate. The lamps will be concealed so that direct rays will not fall on the children. Good results have been reported from similar experiments in Pennsylvania.

• **IDEAL COMMUNITY.**—Pleasantville was chosen for the tests because it was considered to be of ideal size (population 4,367), it has well kept health records, and it has comparatively few commuters to bring new infections into the village. Another factor was the proximity of Mt. Kisco, seven miles away, where similar community conditions exist for checking results.

All expenses except operating charges for the lamps will be borne by the four sponsoring organizations.

★DIALS are *EVENLY* and ACCURATELY CALIBRATED

OVER THEIR *ENTIRE* RANGE BECAUSE OF THE STRAIGHT-LINE EXPANSION OF HYDRAULIC-ACTION



With each degree of temperature, the expansion and contraction of the solid-liquid charge of Hydraulic-Action is exactly the same. That is the reason why the dials on all White-Rodgers Hydraulic-Action controls are *evenly* calibrated—and always are accurate over their *entire* range.

8 EXCLUSIVE FEATURES OF WHITE-RODGERS HYDRAULIC-ACTION TEMPERATURE CONTROLS

1. May be mounted at any angle or position, above, below or on level with control point.

2. Hydraulic-Action principle incorporating solid-liquid filled bulb and capillary provides expansion force comparable to that of a metal bar.

3. Diaphragm motion uniform per degree of temperature change.

4. Power of solid-liquid charge permits unusually sturdy switch construction resulting in positive contact closure.

5. Heavier, longer-wearing parts are possible because of unlimited power.

★**6.** Dials are evenly and accurately calibrated over their entire range because of straight-line expansion.

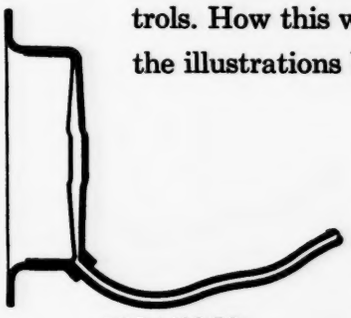
7. Controls with remote bulb and capillary are not sensitive to change in room temperature. Accuracy of control is not affected by temperature changes in surrounding area.

8. Not affected by atmospheric pressure. Works accurately at sea level or in the stratosphere without compensation or adjustment.

UNIFORM EXPANSION OF HYDRAULIC-ACTION PERMITS TROUBLE-FREE INSTALLATION

CONTRACTED

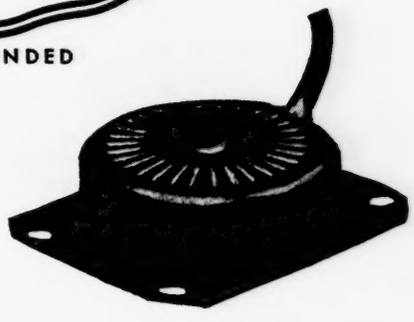
Above is a cross section of the diaphragm and part of the liquid-filled capillary. In this view the liquid has contracted, releasing the pressure on the diaphragm and causing the switch contacts to function.



EXPANDED

In this cross-sectional view, the liquid charge of the capillary has expanded with a rise in temperature. The positive force of this hydraulic action forces the diaphragm outward and causes the switch contacts to function.

No going back to adjust or recalibrate when you equip with White-Rodgers Hydraulic-Action controls. How this works is shown in the illustrations below.



Actual-size illustration of the White-Rodgers diaphragm body, the actuating element of every White-Rodgers temperature control. It is so designed as to exert full pressure at the point of contact with the switch mechanism.

WHITE-RODGERS ELECTRIC CO.

1209 CASS AVENUE **ST. LOUIS 6, MISSOURI**

Controls for Refrigeration • Heating • Air-Conditioning

SMOKE ABATEMENT INTEREST GROWS

Industry and government unite in fight against atmosphere pollution.

• **INDUSTRY.**—Coal producers from the Appalachian producing fields and western Kentucky and some of the railroads serving the territory met in Cincinnati recently to reactivate the Coal Producers Committee for Smoke Abatement.

Before the war the committee was active in smoke abatement work in many cities in the Middle West. It assisted municipal authorities in the preparation of technical data on which to base smoke abatement ordinances.

"Smoke is waste," said R. E. Howe, chairman of the Coal Producers Committee for Smoke Abatement. "It has no defense, for with the proper equipment and good firing methods there is no necessity for smoke."

The committee was formed by the coal industry and the railroads and has at its call scores of fuel engineers throughout the country who are available for consultation without cost to municipal authorities sincerely interested in smoke abatement. Headquarters for the committee will be in the Transportation Building in Cincinnati.

• **OTHER CITIES.**—Typical of the situation in a number of major cities is an anti-smoke campaign now being organized in Cleveland, which in 1939 adopted a strict smoke abatement code requiring large industrial plants to be in full compliance by 1943. With the war making replacement of obsolete equipment impossible, enforcement as originally planned was not attempted. Because of current coal and manpower problems and the prospect that modern types of smoke abatement devices will not become easily available for another six to twelve months, Cleveland officials recognize that a satisfactory job of smoke control is still a long way off but are going ahead with enforcement plans. Mayor Burke has launched a program to build up a strong enforcement organization which hopes to abolish the clouds of smoke and dirt which now deposit an estimated 50 tons of dirt on every square mile of the city each month, causing damage figured to exceed $10,000,000 a year.

Indianapolis, which also adopted a stringent smoke control ordinance shortly before the war, is scheduled to start an enforcement program Jan. 1. Developed by a subcommittee of Mayor Robert H. Tyndall's Postwar Planning Committee, the Indianapolis program places smoke control under a non-political citizens' advisory committee and requires choice of an enforcement staff on a merit basis.

Baltimore is another city planning more effective enforcement of its smoke control rules (H & V, Oct. '45, p. 122). City Smoke Abatement Engineer J. H. McKay has announced an appreciable response already to appeals to industrial plants, apartment houses, hospitals and others to obtain equipment for the abatement of smoke and its solids as it becomes available. Considerable interest was evidenced in ash-collection devices, McKay said, but predicted that many smaller establishments would shift to oil burning equipment in preference to acquiring collection equipment.

Louisville has adopted a smoke control ordinance and is now preparing an enforcement program. Wilmington, Del., recently issued a warning that action would be taken against violators of its smoke regulations unless corrective steps were taken. Complaints in Wilmington had been made against laundry and dry cleaning establishments, two of which at this writing had converted to oil, with others planning to follow suit. Columbus, O., is another of the cities in which renewed smoke control interest has been shown.

Under consideration in Milwaukee was an ordinance to prohibit the discharge of smoke, soot, cinders, noxious gases, fumes or fly ash. A uniform county-wide smoke abatement ordinance, enforced on a county-wide basis, also was suggested as necessary to solution of Milwaukee's problems. More rigid smoke control regulations were proposed in Atlanta by Mayor Hartsfield, with similar interest reported from other cities throughout the country.

A threatened shortage of coal this winter was cited at the recent convention in Columbus, O., of the Smoke Prevention Association as a reason why stringent smoke abatement measures should be taken now. Several speakers emphasized that smoke indicates waste, with one asserting that "fuel conservation and smoke control is the same thing."

• **CENTRAL HEAT.**—Of possible long-range significance was the address at the association's convention by Robert L. Fitzgerald of the Duluth Steam Corp., Duluth, Minn., who declared that cities could solve their smoke nuisance problems by installing central steam utilities (H & V, Oct. '45, p. 116) which would operate the same as electric and gas utilities. Citing the success of central steam utilities in Europe, he said that "only in America is there a reluctance to take these progressive steps for a smoke-free city."

Virginia, Minn., was mentioned by Fitzgerald as one city which has steam heating system throughout, while Duluth has a downtown steam heating district system which promises to expand into residential areas in the future.

"There is no phase of the urban heating problem that cannot be solved, once central heating is available," Fitzgerald contended. Asserting it would be economical to take this far-reaching step, he estimated that the per capita damage from smoke in any large city is not less than $20 annually. "Steam service to a city would be no more costly than other utilities," he declared.

• **LOUISVILLE.**—Placing of all publicly owned buildings on an "example" basis in the elimination of smoke, was the job Mayor Wilson W. Wyatt asked the new Smoke Commission to undertake first, after swearing in five of the seven members of the new group.

The Mayor urged the group to start on the public buildings, including the hospital, jail, housing projects, libraries, schools and others so that these buildings would set the example in the forthcoming smoke abatement program.

The commission was provided for under a newly passed ordinance which sets up a set of standards which all buildings of more than four-apartment size have to meet under penalty of fines.

• **ASSOCIATION.**—Municipal smoke inspectors should be relieved of political pressure by having full service protection, declared a resolution adopted at the closing session of the Smoke Prevention Association of America recently in Columbus.

"It is almost impossible for cities to obtain competent smoke inspectors through political appointment, and in many cases no inspector at all because political employment does not guarantee proper salary or a lasting job for combustion engineers," said the resolution.

Another resolution calling for standard measurement of air pollution, and appealing to the U. S. Weather Bureau to make the study in connection with atmospheric pressure was adopted. Such a step, it said, would end sporadic study of air pollution by smoke and dust. The information also would be available to commercial air lines.

W. E. E. Koepler, vice-president, said the resolution calling for civil service protection for all smoke inspectors will be submitted to the next meeting of the U. S. Conference of Mayors.

WHAT'S THE MARKET PRICE OF FILTERED AIR ?..

Here's an inside tip on Filtered Air and Dust-Stop* preferred. When Dust-Stops are in the heating and air conditioning systems it's a good indication that there will be continual profit taking by the user.

Low Initial Cost

Heating and Ventilating Engineers recommend Dust-Stops and the complete ready-to-assemble steel frames as a sound investment.

Ready adaptability to any system, regardless of the C.F.M. requirements, flexibility of installation, easy access to filters and the low cost of this part of the system are but a few of the reasons for the widespread preference for these replacement-type air filters.

Safe Investment

Dust-Stop Air Filters are highly efficient—are readily available, at low cost from near-by suppliers. Both initial cost and upkeep are low. Maintenance requires a minimum of man power and time.

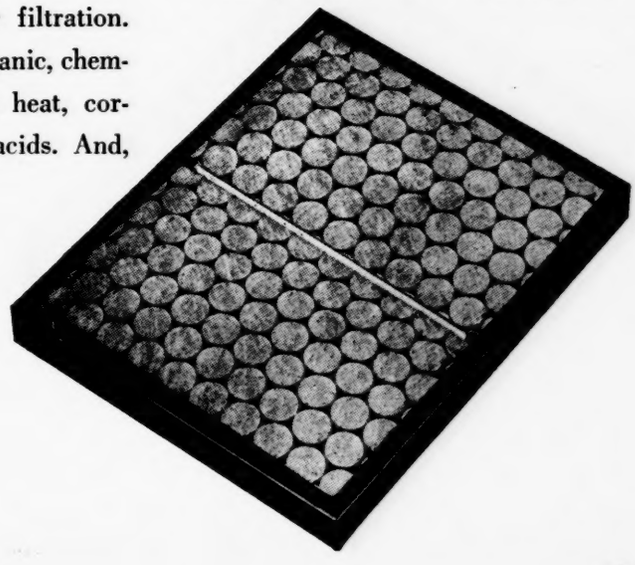
Keeps Paying Dividends

Dust-Stop Air Filters are constructed of packs of glass fibers (Fiberglas*) coated with an adhesive, faced with metal grilles and bound on the edges with a fiberboard frame.

The Fiberglas fibers, packed to proper density, form an exceptionally effective medium for air filtration. Being glass, they are inorganic, chemically stable, resistant to heat, corrosive vapors and most acids. And, being glass, they do not absorb the nonodorous, nonevaporating adhesive with which they are coated. Each impinged particle of dust is quickly soaked, acting as a wick to carry adhesive to other particles. Thus, the adhesive remains effective until the filter is so heavily loaded with dust that resistance to air flow calls for replacement.

For complete information and typical Dust-Stop installation details, see Sweet's Files or write: *Owens-Corning Fiberglas Corporation, 1912 Nicholas Building, Toledo 1, Ohio.*

In Canada, Fiberglas Canada Ltd., Oshawa, Ont



DUSTOP AIR FILTERS

*REG. U.S. PAT. OFF.

—a FIBERGLAS product

Degree-Days for September, 1945

HEATING AND VENTILATING'S 19TH YEAR OF PUBLICATION OF MONTHLY DEGREE-DAY DATA

CITY	SEPTEMBER			CUMULATIVE, SEPTEMBER 1 TO SEPTEMBER 30			HEATING SEASON[1]
	1945	1944	NORMAL	1945	1944	NORMAL	NORMAL
Abilene, Texas	37	0	0	37	0	0	2061
Albany, New York	111	127	72	111	127	72	6580
Albuquerque, New Mexico	53	21	0	53	21	0	4298
Alpena, Michigan	252	220	222	252	220	222	8299*
Anaconda, Montana	398	307	335	398	307	335	8357**
Asheville, North Carolina	18	0	0	18	0	0	4232
Atlanta, Georgia	1	4	0	1	4	0	2890
Atlantic City, New Jersey	19	31	0	19	31	0	5176
Augusta, Georgia	0	0	0	0	0	0	2161
Baker, Oregon	328	217	258	328	217	258	7163
Baltimore, Maryland	19	27	0	19	27	0	4533
Billings, Montana	299	192	189	299	192	189	7119
Binghamton, New York	114	122	108	114	122	108	6808
Birmingham, Alabama	1	0	0	1	0	0	2352
Bismarck, North Dakota	330	233	222	330	233	222	9192
Block Island, Rhode Island	46	59	0	46	59	0	5788
Boise, Idaho	227	130	102	227	130	102	5552
Boston, Massachusetts	71	90	48	71	90	48	6045
Bozeman, Montana	386	281	336	386	281	336	8521**
Buffalo, New York	125	119	75	125	119	75	6822
Burlington, Vermont	171	173	144	171	173	144	7514
Butte, Montana	446	344	344	446	344	344	8272
Cairo, Illinois	16	0	0	16	0	0	3909
Canton, New York	210	202	189	210	202	189	8020
Charles City, Iowa	221	132	93	221	132	93	7588
Charleston, South Carolina	0	0	0	0	0	0	1769
Charlotte, North Carolina	3	8	0	3	8	0	3120
Chattanooga, Tennessee	1	1	0	1	1	0	3118
Cheyenne, Wyoming	359	236	240	359	236	240	7466
Chicago, Illinois	103	77	0	103	77	0	5957
Cincinnati, Ohio	24	41	0	24	41	0	4684
Cleveland, Ohio	75	90	27	75	90	27	6155
Columbia, Missouri	70	32	0	70	32	0	4922
Columbia, South Carolina	0	3	0	0	3	0	2364
Columbus, Ohio	31	53	0	31	53	0	5398
Concord, New Hampshire	164	169	168	164	169	168	7353
Concordia, Kansas	111	46	0	111	46	0	5315
Dallas, Texas	18	0	0	18	0	0	2256
Davenport, Iowa	123	52	0	123	52	0	6289
Dayton, Ohio	47	54	0	47	54	0	5264
Denver, Colorado	219	87	72	219	87	72	5874
Des Moines, Iowa	124	70	0	124	70	0	6384
Detroit, Michigan	109	91	42	109	91	42	6490
Devils Lake, North Dakota	390	275	276	390	275	276	9970
Dodge City, Kansas	118	57	0	118	57	0	5035
Dubuque, Iowa	161	83	36	161	83	36	6790
Duluth, Minnesota	344	279	270	344	279	270	9443
Eastport, Maine	239	222	276	239	222	276	8520**
Elkins, West Virginia	62	139	63	62	139	63	5697
El Paso, Texas	28	0	0	28	0	0	2428
Ely, Nevada	311	246	0	311	246	0	—
Erie, Pennsylvania	83	—	36	83	—	36	6273
Escanaba, Michigan	263	213	243	263	213	243	8771*
Evansville, Indiana	25	21	0	25	21	0	4244
Fort Smith, Arkansas	8	0	0	8	0	0	3147
Fort Wayne, Indiana	102	101	0	102	101	0	5925
Fort Worth, Texas	22	0	0	22	0	0	2148
Fresno, California	4	1	0	4	1	0	2334
Galveston, Texas	0	0	0	0	0	0	1016
Grand Junction, Colorado	91	6	0	91	6	0	5548
Grand Rapids, Michigan	150	100	57	150	100	57	6535
Green Bay, Wisconsin	222	163	132	222	163	132	7825
Greensboro, North Carolina	11	24	0	11	24	0	3529
Greenville, South Carolina	4	13	0	4	13	0	3380
Harrisburg, Pennsylvania	57	59	0	57	59	0	5375
Hartford, Connecticut	77	87	48	77	87	48	6036
Hatteras, North Carolina	0	1	0	0	1	0	2571
Havre, Montana	353	197	270	353	197	270	8700
Helena, Montana	379	268	251	379	268	251	7898
Houston, Texas	0	0	0	0	0	0	1157
Huron, South Dakota	240	158	123	240	158	123	8004
Indianapolis, Indiana	47	34	0	47	34	0	5298
Jackson, Miss.	0	0	—	0	0	—	—
Kansas City, Missouri	62	23	0	62	23	0	4956
Kewanee, Illinois	(a)	41	78	(a)	41	78	6139
Knoxville, Tennessee	6	1	0	6	1	0	3670
La Crosse, Wisconsin	238	111	96	238	111	96	7322
Lander, Wyoming	365	249	276	365	249	276	7947

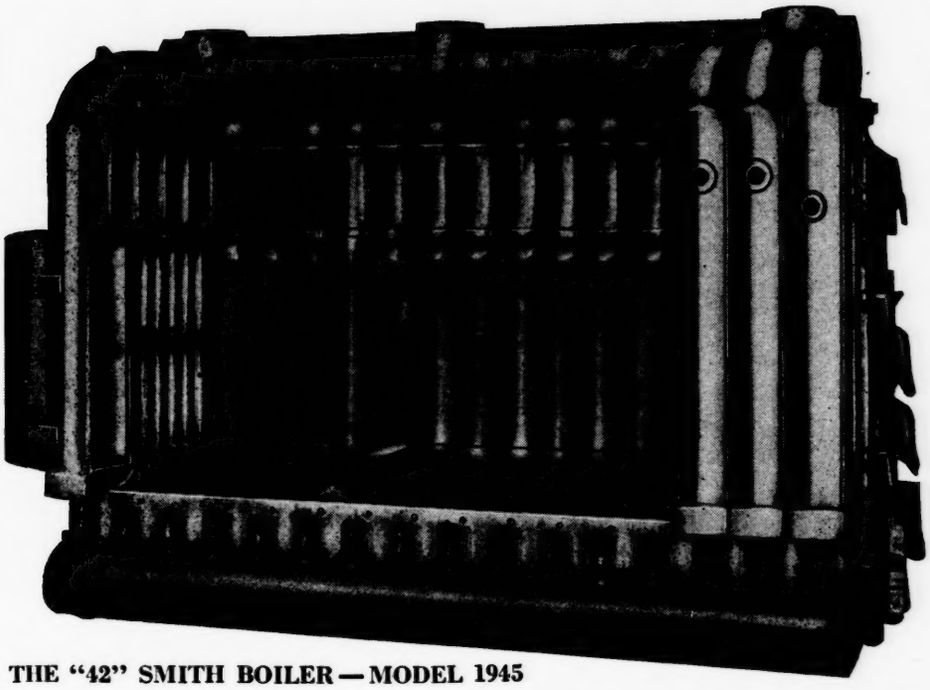
[1]Figures in this column are normal totals for a complete heating season, September to June, incl.

Figures in this table, with nine exceptions, based on local weather bureau reports. Exceptions are Utica, Lewiston, Kewanee, Sioux City, and Jackson, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y.; Norman E. Ross, Bursar, Bates College, Lewiston, Me.; J. M. Hartman, Engineering Department, Kewanee Boiler Corp., Kewanee, Ill., Alfred R. Waystaff, Engineer, Sioux City Foundry and Boiler Co., Sioux City, Iowa, and H. M. Ludlow, Box 1368, Jackson, Miss., respectively; Anaconda, Bozeman, Butte and Livingston, Mont., through the courtesy of the Montana Power Company.

(a) Data not available.

[Table concluded on page 106]

NEW AND IMPROVED!



THE "42" SMITH BOILER — MODEL 1945

"42" Smith BOILER IS FIRST CHOICE . . . WHEREVER HEATING DEMANDS ARE HEAVY

Here is an improved big cast iron boiler for that heavy duty job . . . whether it be factory, hospital or public building. Known to engineers and contractors as "tops" for use with solid fuels, whether hand or stoker fired, the 42 Smith has recently been redesigned to effect an even further improvement in its already high standard of performance. Check the features of this modern efficient unit against the requirements of that tough job you're figuring now. We think you'll find the 42 Smith a natural!

- ✓ — *Water tube construction* promotes efficient water circulation, fast steaming.
- ✓ — *Plenty of heating surface.* Even more prime surface has been added in the new model.
- ✓ — *Made of rugged cast iron* for long service, low maintenance.
- ✓ — *Header type construction* minimizes possibility of mid-season breakdown.
- ✓ — *Properly proportioned* for stokers or other automatic firing devices.
- ✓ — *Convertible* from one fuel to another both easily and inexpensively.

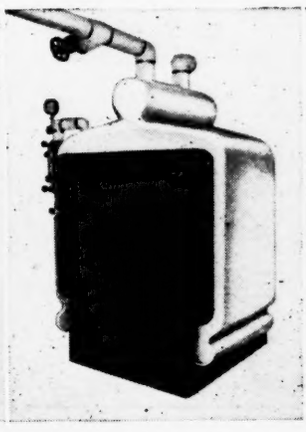
H.B. Smith
CAST-IRON BOILERS

Write for free catalogue

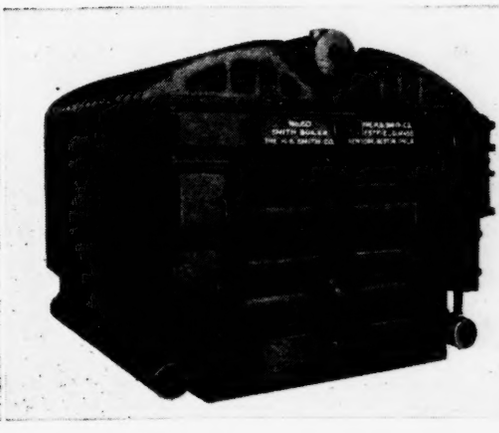
THE H. B. SMITH CO., INC. WESTFIELD, MASS.
Offices and Sales Representatives in Principal Cities

Smith-Mills Residential Units

Mills Boilers for Medium Size Jobs



42 and 60 Smith Boilers for Large Installations



Smith Hot Water Supply Boilers

Degree-Days for September, 1945 (Concluded)

HEATING AND VENTILATING'S 19TH YEAR OF PUBLICATION OF MONTHLY DEGREE-DAY DATA

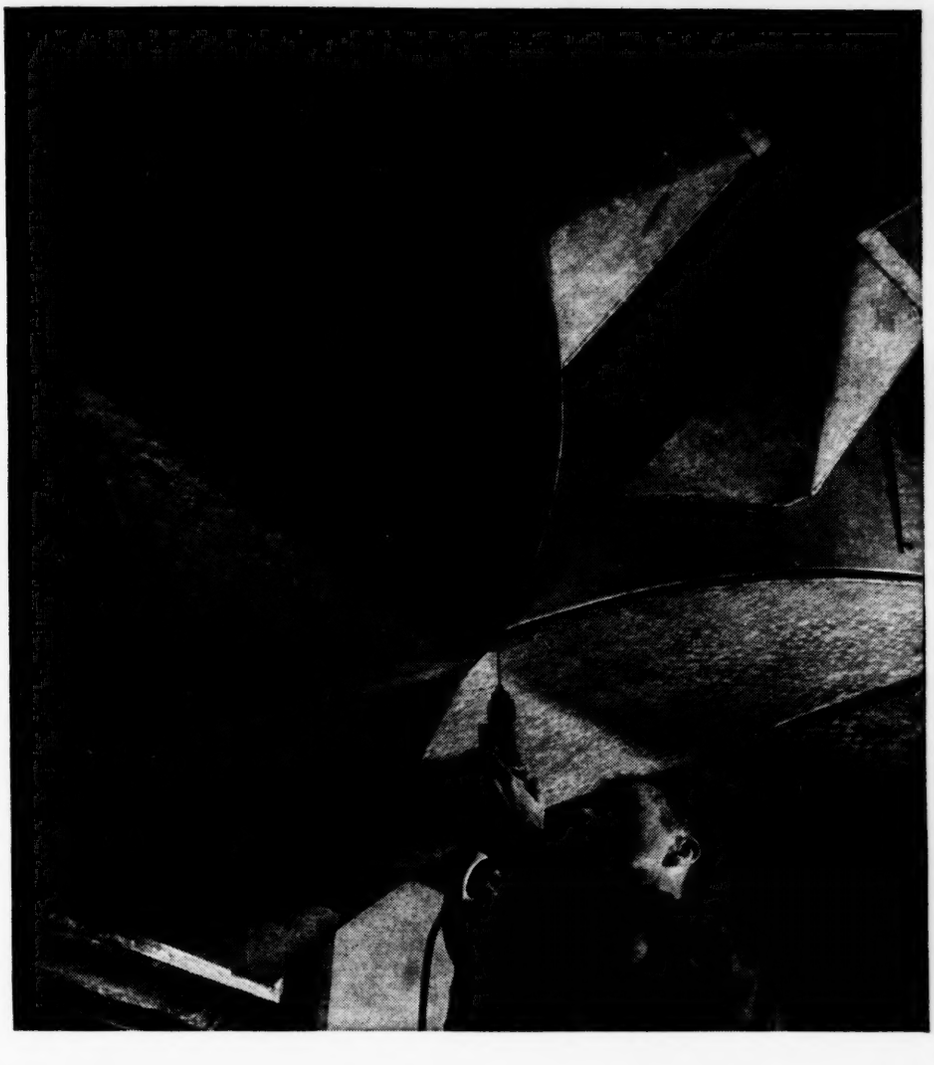
CITY	SEPTEMBER			CUMULATIVE, SEPTEMBER 1 TO SEPTEMBER 30			HEATING SEASON[1]
	1945	1944	NORMAL	1945	1944	NORMAL	NORMAL
Lansing, Michigan	180	154	114	180	154	114	7048
Lewiston, Maine	195	186	165	195	186	165	7707
Lincoln, Nebraska	112	57	0	112	57	0	5999
Little Rock, Arkansas	13	0	0	13	0	0	2811
Livingston, Montana	361	308	227	361	308	227	7205
Los Angeles, California	2	5	0	2	5	0	1504
Louisville, Kentucky	12	16	0	12	16	0	4180
Lynchburg, Virginia	15	37	0	15	37	0	3980
Macon, Georgia	0	0	0	0	0	0	2201
Madison, Wisconsin	187	111	87	187	111	87	7429
Marquette, Michigan	281	244	225	281	244	225	8693*
Memphis, Tennessee	11	0	8	11	0	8	2950
Meridian, Mississippi	0	0	0	0	0	0	2160
Milwaukee, Wisconsin	170	82	84	170	82	84	7245
Minneapolis, Minnesota	227	134	93	227	134	93	7850
Modena, Utah	178	101	156	178	101	156	6562
Montgomery, Alabama	0	0	0	0	0	0	1884
Nantucket, Massachusetts	56	59	63	56	59	63	5957
Nashville, Tennessee	7	1	0	7	1	0	3507
New Haven, Connecticut	64	75	39	64	75	39	5895
New Orleans, Louisiana	0	0	0	0	0	0	1024
New York, New York	33	35	24	33	35	24	5347
Nome, Alaska	Degree-days for June, 1945 (not previously published) are 735. Total for season (Sept. 1 to June 30, 1945) is 13221.						
Norfolk, Virginia	0	5	0	0	5	0	3350
North Head, Washington	288	224	255	288	224	255	5452**
North Platte, Nebraska	197	94	42	197	94	42	6366
Oakland, California	75	97	90	75	97	90	3143**
Oklahoma City, Oklahoma	45	10	0	45	10	0	3613
Omaha, Nebraska	116	62	0	116	62	0	6131
Oswego, New York	134	133	114	134	133	114	7088
Parkersburg, West Virginia	34	58	0	34	58	0	4775
Peoria, Illinois	102	69	3	102	69	3	6109
Philadelphia, Pennsylvania	31	31	0	31	31	0	4855
Phoenix, Arizona	0	0	0	0	0	0	1405
Pittsburgh, Pennsylvania	62	64	0	62	64	0	5235
Pocatello, Idaho	307	203	156	307	203	156	6655
Portland, Maine	178	192	162	178	192	162	7218
Portland, Oregon	111	80	105	111	80	105	4469
Providence, Rhode Island	60	61	63	60	61	63	6015
Pueblo, Colorado	176	67	6	176	67	6	5514
Raleigh, North Carolina	0	5	0	0	5	0	3234
Rapid City, South Dakota	285	149	144	285	149	144	7118
Reading, Pennsylvania	44	50	0	44	50	0	5389
Red Bluff, California	5	2	—	5	2	—	—
Reno, Nevada	195	149	144	195	149	144	5892
Richmond, Virginia	3	16	0	3	16	0	3695
Rochester, New York	138	134	72	138	134	72	6732
Roseburg, Oregon	106	73	111	106	73	111	4428
Roswell, New Mexico	58	19	0	58	19	0	3484
Sacramento, California	13	3	0	13	3	0	2653
St. Joseph, Missouri	82	36	0	82	36	0	5161
St. Louis, Missouri	47	17	0	47	17	0	4585
Salt Lake City, Utah	211	67	18	211	67	18	5555
San Antonio, Texas	5	0	0	5	0	0	1202
San Diego, California	1	6	0	1	6	0	1645
Sandusky, Ohio	61	71	0	61	71	0	6208
San Francisco, California	112	149	114	112	149	114	3264**
Sault Ste. Marie, Michigan	354	281	276	354	281	276	9285**
Savannah, Georgia	0	0	0	0	0	0	1490
Scranton, Pennsylvania	83	107	60	83	107	60	6129
Seattle, Washington	171	93	186	171	93	186	4934**
Sheridan, Wyoming	312	209	264	312	209	264	8008
Shreveport, Louisiana	0	0	0	0	0	0	1938
Sioux City, Iowa	192	117	33	192	117	33	6898
Spokane, Washington	266	152	192	266	152	192	6355
Springfield, Illinois	66	30	0	66	30	0	5373
Springfield, Missouri	55	29	0	55	29	0	4428
Syracuse, New York	134	135	96	134	135	96	6893
Tacoma, Washington	237	127	207	237	127	207	5181**
Terre Haute, Indiana	44	35	0	44	35	0	4872
Toledo, Ohio	92	103	9	92	103	9	6077
Topeka, Kansas	71	26	0	71	26	0	4969
Trenton, New Jersey	44	49	0	44	49	0	4933
Utica, New York	131	151	182	131	151	182	6796
Valentine, Nebraska	251	144	93	251	144	93	7039
Walla Walla, Washington	136	65	30	136	65	30	4808
Washington, D. C.	16	24	0	16	24	0	4626
Wichita, Kansas	65	30	0	65	30	0	4673
Williston, North Dakota	404	241	270	404	241	270	9323
Winnemucca, Nevada	243	166	192	243	166	192	6427**
Yakima, Washington	136	79	120	136	79	120	5599

(a) Data not available.

*Includes August.
**Includes July and August.

[1]Figures in this column are normal totals for a complete heating season. September to June, incl.

THE SHEETS THAT DO THE JOB



Now's the time for replacements and repairs on furnaces, piping and ductwork. And now's the time to team up with dependable, reliable Bethlehem Galvanized sheets.

They'll do the job, and satisfy you and your customers. Uniform in gage and size, tightly coated with high-grade zinc, these galvanized sheets are ductile, easy to form, seam, bend, solder. You can trust Bethlehem sheets. Convince yourself, if you haven't already, by giving them a trial.

BETHLEHEM STEEL SHEETS

BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa.

Bethlehem Steel Export Corporation
New York

BETHLEHEM STEEL

PIONEER OF THE STOKER INDUSTRY . . . ONE OF THE LEADERS IN NATIONAL SALES VOLUME!
• T-3 (30 POUNDS)
• T-5 (50 POUNDS)
Domestic Models
FREEMAN
STOKERS
FIRST CHOICE OF AMERICA'S FOREMOST HEATING ENGINEERS
FREEMAN STOKER DIVISION
ILLINOIS IRON & BOLT CO.
918 S MICHIGAN AVE., CHICAGO 5, ILLINOIS

. . . Since the Last Issue

Four new appointments of key personnels, all from within the organization, have been announced by Russell Maguire, president of **Alco Valve Co.**, St. Louis, designers and manufacturers of automatic refrigerant control devices. **John E. Dube,** a vice-president, has also been appointed general manager, **Charles B. Lockwood,** also a vice-president, assistant general manager, **Roger P. Kipp,** sales manager, and **Franklin M. MacDougall,** chief engineer. Dr. Dube joined the Alco organization in 1938 and soon became head of the engineering department. He was elected vice-president in 1942. Mr. Lockwood, secretary-treasurer of the company since

J. E. Dube *C. B. Lockwood* *R. P. Kipp* *F. M. MacDougall*

1942, was recently elected a vice-president, and now becomes assistant general manager as well. Mr. Kipp has been identified with the sales department since he joined Alco in 1937, with the exception of the war years, 1942-45, when he served the company as procurement director. Early this year he was re-appointed a divisional sales manager, and now heads the entire sales organization. Mr. MacDougall joined the firm in 1936 and for the past few years has served as assistant director of engineering. As chief engineer he now becomes head of that department, succeeding Mr. Dube.

The Motor Division of **General Electric's** Apparatus Department has been reorganized, according to an announcement by K. H. Runkle, Manager of the Industrial Divisions, Schenectady, N. Y. In view of the large volume of electric motor business, and the advisability of segregating it into a natural arrangement of operating units, the Motor Division is now separated into four Divisions and one section. **W. H. Henry,** formerly manager of the Motor Division, is appointed assistant manager of the Industrial Divisions in charge of the motor business. The following Division managers have been appointed: **A. W. Bartling,** manager Fractional-hp Motor Division; **Elliott Harrington,** manager Induction Motor Division; **J. T. Farrell,** manager D-C Motor Division; and **P. A. McTerney,** manager Synchronous, Large D-C, and Gear-motor Division.

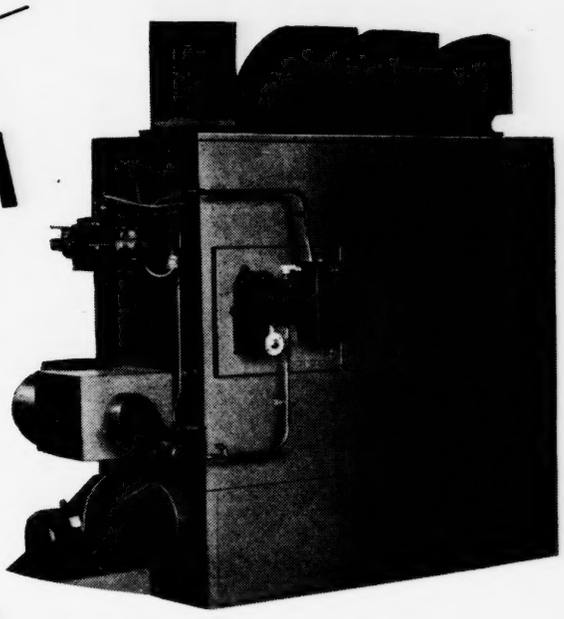
Tube-Turns, Inc., Louisville, Ky., has announced the appointment of **Fred C. Smith** as director of quality. A native of Marion, Ind., Mr. Smith acquired his B.S. and Ch.E. degrees at Purdue and began his administrative career as plant metallurgist with International Harvester in Fort Wayne and Chicago. Prior to joining Tube Turns in January, 1943, as chief metallurgist, he was field metallurgist for Carnegie-Illinois. He is a member of the American Society for Metals; the American Society of Automotive Engineers; the American Welding Society and other technical bodies.

F. C. Smith

It's New!

THE AIRTHERM SPACE HEATER

Provides More Efficient . . . More Economical Heat



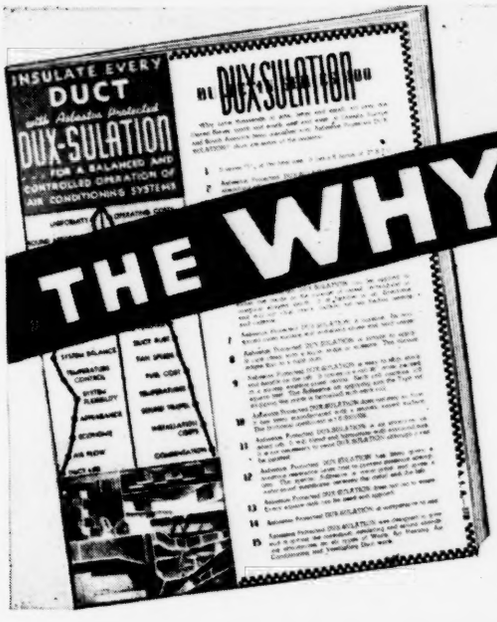
THE new Airtherm Space Heater provides an even distribution of heat to all parts of the building through high velocity nozzles — is installed with a minimum of installation costs and requires practically no maintenance.

The new Airtherm Space Heater is available in 3 models — for floor mounting (as illustrated) or horizontal or vertical suspension. Choice of gas or oil burners on all models. Capacities from 650,000 to 1,950,000 BTU's per hour.

Write for bulletin describing this new, efficient, money-saving heater, in detail.

AIRTHERM MANUFACTURING COMPANY

722 S. Spring Avenue • St. Louis 10, Missouri



THE WHY OF DUCT INSULATION!

If you haven't read it — You Can Get the Complete Story!

The DUX-SULATION story of insulating Ducts is yours for the asking—simply fill in the coupon below and mail —it will prove to be of great value to you—each page is full of money-saving facts. You'll find it interesting reading—no obligation, of course.

8 PAGES of Valuable Information!

GRANT WILSON, INC.

141 WEST JACKSON BLVD. AT LA SALLE ST. CHICAGO 4, ILL.
22nd Floor, Board of Trade Bldg. Phone Wabash 8220

DUX-SULATION saves 75% of the bare duct heat loss—has high thermal insulating efficiency of 70% (K factor .27 B.T.U.). Is ½" thick and has smooth surface giving an exceptionally low frictional resistance (F = 0.0001322).

DUX-SULATION also deadens metallic noises when applied to outside of ducts and will absorb 70% of air borne noises in less than 10 lineal feet of lined duct.

DUX-SULATION comes complete—nothing else to buy—36" wide roll contains 100 sq. ft. Quick and easy application. Shipped complete with sufficient adhesive to glue the felt on the metal duct surfaces and special tape for corners and joints.

Send Bulletin No. 407-V containing the full story of DUX-SULATION—the all purpose insulation.

FIRM NAME .....

STREET .....

CITY ..... STATE .....

ATTENTION OF .....

ADSCO
VERTICAL STEAM TRAPS

Never Come Out of the Pipe Line

★

All working parts attached to cover

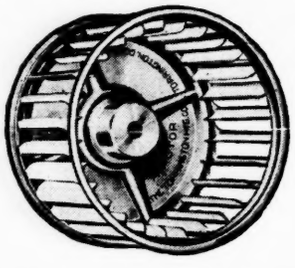
So light that it can be borne entirely by the piping — with valve and float mechanism mounted on cover, and all piping connection on the body, the Adsco Vertical Steam Trap need never come out of the pipe line.

If cleaning or adjustments are necessary the cover with all working parts can be removed quickly without disturbing the piping. By keeping an extra cover with valve assembly on hand this "spare" can be substituted in a few minutes with practically no interruption to service, and the original assembly taken to the work shop for servicing.

Double Life. This trap also has a reversible valve and reversible seat of non-corrosive stainless alloy steel which gives it double life. Write for Bulletin No. 35-86HV and prices.

AMERICAN DISTRICT STEAM COMPANY
NORTH TONAWANDA, NEW YORK
Makers of "UP-TO-DATE" Steam Line Equipment For Over 65 Years

AIR IMPELLERS
for every purpose



AIROTOR BLOWER WHEEL

Torrington can supply either blower wheels or propeller fan blades for your products. Airotor blower wheels are made of steel or aluminum, single or double width, in diameters from 1½" to 12", with a choice of several widths in most sizes. Sold in production lots only.

Write for an Air Impeller Specification Sheet and use it to obtain our recommendation on the air impeller best suited to your product.

THE TORRINGTON
MANUFACTURING COMPANY, TORRINGTON, CONN.

The Perfex Corp. of Milwaukee, announces that **Curtis H. Soderberg** has resumed his pre-war duties as manager of their Philadelphia office. Soderberg, who has been associated with the heating industry for the past 17 years, had been located in the Milwaukee office since July 1942, where he served as manager of the Priorities department and also as liaison man for development engineering.

At the 27th Annual Convention of the American Legion, Department of New Jersey, held in Atlantic City, N. J., **J. C. Fitts** was elected commander. Mr. Fitts is well known as secretary of the **Heating, Piping and Air Conditioning Contractors National Association,** a member of the publication committee of the ASHVE, and chairman of the technical advisory committee on radiation and comfort.

J. C. Fitts

Mr. Fitts served in the U. S. Army during World War I, from 1916 to 1919, and was a captain in the Corps of Engineers. In 1919 he became secretary of the Committee on Standards, secretary of Committee on Certified Heating, secretary of Committee on Trade Promotion, and associate editor of the *Official Bulletin* of the Heating and Piping Contractors National Association.

After 11 years on the HPNA staff, Mr. Fitts was elected secretary of the association at its June meeting in 1930. He was born at Washington, N. J., on October 10, 1890, and after graduating from Washington High School he attended the Centenary Collegiate Institute. He received his A.B. (Magna Cum Laude) from Princeton in 1912.

Two additions to the sales staff of **ILG Electric Ventilating Co.** have been announced. **R. E. Pauling** has been named manager of the Tulsa, Oklahoma, office. He served as president of the Oklahoma chapter of the ASHVE. **Marion A. Elliotte** has been appointed to the staff of the Detroit, Michigan, office. Immediately preceding his ILG appointment, he was employed in sales engineering and product development department of Marine Products Co.

R. E. Pauling

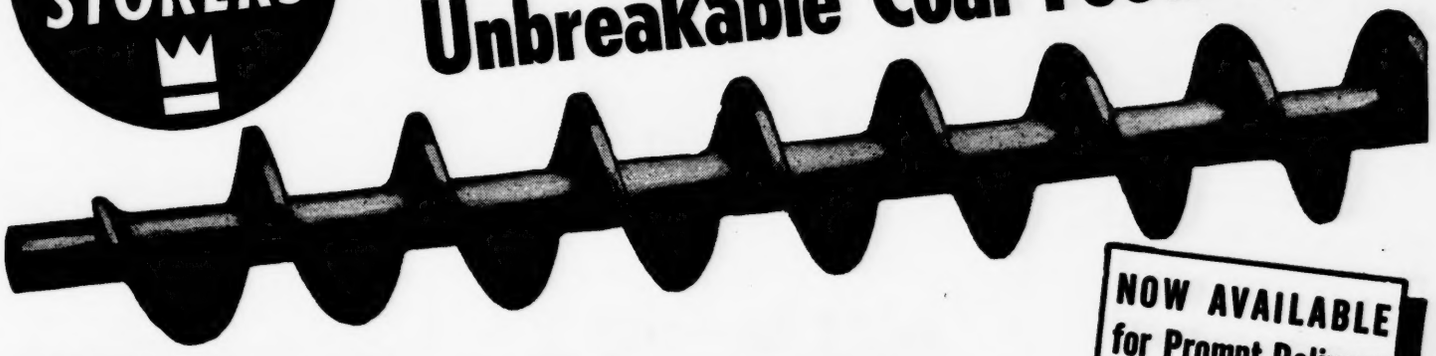
M. A. Elliotte

The Herman Nelson Corp. announce that all manufacturing operations of the company's blower division will be transferred from Chicago to the new 55,000 sq. ft. plant recently completed in Moline, Ill.

Peerless Pump Division of Food Machinery Corp., in an expansion of engineering and sales has opened an office in Dallas, Texas, 912 Irwin-Keasler Building. **W. E. Griffin** has been appointed manager of the office.

For STOKERS

The CROWN Unbreakable Coal Feed Screw



NOW AVAILABLE for Prompt Delivery

WELDED All-Steel Worm—All Sizes—All Pitches

★Crown's complete line of all-steel Coal Feed Screws meets every replacement and production requirement. Produced for both domestic and industrial stokers. Crown Screws are available with right or left hand screw, in all sizes and pitches, tapered or straight, and in combinations of pitches. Uniformly smooth surfaces insure that coal will flow freely and easily through the flights. Because it is all-steel with continuous weld, the Crown Coal Feed Screw guarantees long, continuous operation with full customer satisfaction. Crown is in a position to make prompt delivery on all sizes.

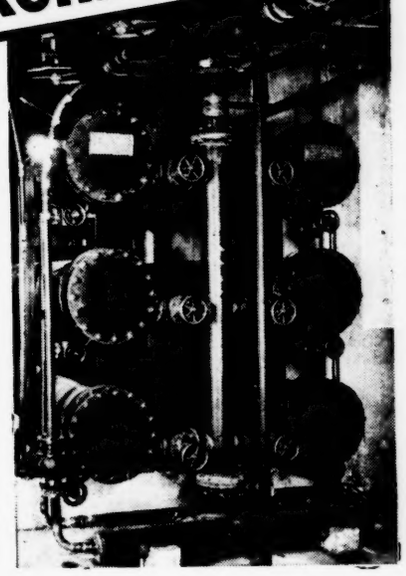
In ordering give complete specifications on size and design.

CROWN IRON WORKS COMPANY

1207 Tyler St., N. E. *Since 1878* Minneapolis, Minn.

CONSECO

Air Conditioning HEAT EXCHANGERS



Twenty years' specialized experience designing, fabricating and servicing heat exchangers assure sound design, quality construction and economical operation with any type refrigerant. Engineering assistance gladly furnished. Write.

Conseco CO_2 heat exchangers operating at 1200 psi in various Sanger chain theatres.

SERVICE

CONDENSER SERVICE & ENGINEERING CO., INC.

63 RIVER STREET, HOBOKEN, N. J. • *Phone Any Time*

CONDENSERS • LOW PRESSURE EVAPORATORS • AIR EJECTORS • HEAT EXCHANGERS • PUMPS

TUBE CLEANING GUNS AND PLUGS
AIR AND EROSION ELIMINATORS
BEVEL GEAR UNIVERSAL JOINTS
STRAINERS, GREASE EXTRACTORS
WIZARD INJECTORS, FILTERS

Peerless presents the

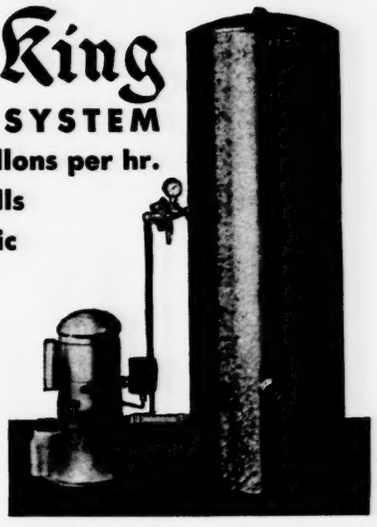
Water King PUMPING SYSTEM

275 to 1300 gallons per hr.

For shallow wells

100% Automatic

Embodies magic intracentric water-lift



Applying a revolutionary water-lifting principle, with a magic pumping element intracentrically positioned within the pump case, Peerless presents the most advanced Pumping System—the *Water King*. The pumping element is the famous Peerless Hi-Lift, ingeniously applied in simplest form. Pressure maintained automatically. Silent, smooth, non-pulsating operation. Pump can be installed over-well or off-set. Heavy-duty, capacitor type motor. 1/6 to 3/4 h.p. No moving parts below surface. Water-lubricated. No sand cutting. Streamline design.

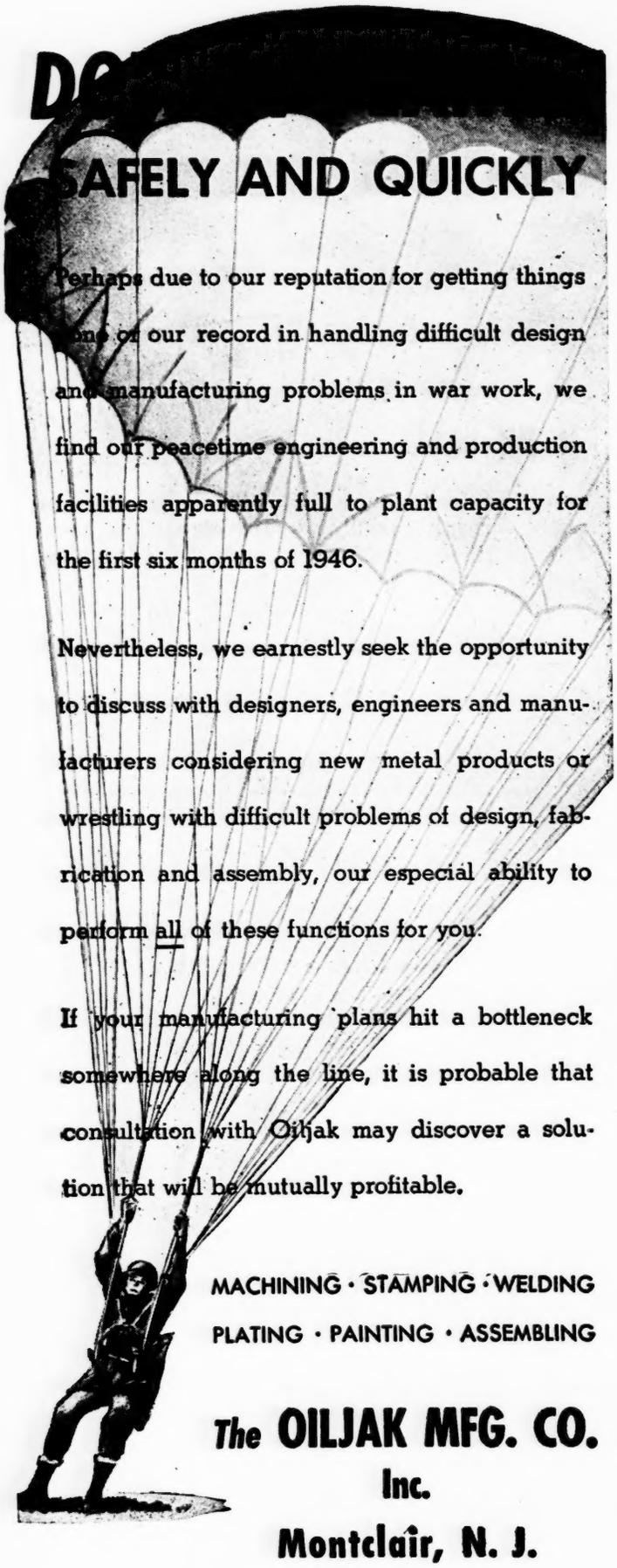
Peerless JET Water System

Improved design. For deep or shallow wells. Over-well or off-set. Capacities 300 to 5000 gallons per hour. 100% automatic.

PEERLESS PUMPS

PEERLESS PUMP DIVISION
Food Machinery Corp.

FACTORIES
LOS ANGELES 31, CALIFORNIA
301 West Avenue Twenty-six
QUINCY, ILL. • CANTON 6, OHIO



DO SAFELY AND QUICKLY

Perhaps due to our reputation for getting things done, or our record in handling difficult design and manufacturing problems in war work, we find our peacetime engineering and production facilities apparently full to plant capacity for the first six months of 1946.

Nevertheless, we earnestly seek the opportunity to discuss with designers, engineers and manufacturers considering new metal products or wrestling with difficult problems of design, fabrication and assembly, our especial ability to perform all of these functions for you.

If your manufacturing plans hit a bottleneck somewhere along the line, it is probable that consultation with Oiljak may discover a solution that will be mutually profitable.

MACHINING · STAMPING · WELDING
PLATING · PAINTING · ASSEMBLING

The OILJAK MFG. CO.
Inc.
Montclair, N. J.

The Job Complete—from blueprint to finished product

Barber-Colman Co. has announced the appointment of **R. H. Wittbold** as its representative in the Houston, Texas area for automatic controls and air distribution equipment. Mr. Wittbold has been associated with the Barber-Colman Co. since 1935, having been located in the Chicago factory branch office. Since 1941 he has been Branch Manager. A graduate in Mechanical Engineering from the University of Illinois, Wittbold has

L. C. Plaehn

R. H. Wittbold

been active in the field of heating, ventilating, and air conditioning for the past thirteen years. Barber-Colman Co. also announces the promotion of **L. C. Plaehn**, Eastern District Field Engineer, to Southeastern District Manager for automatic controls, air distribution equipment, and small motors. Mr. Plaehn has been with Barber-Colman since 1930, having been Branch Manager of the Milwaukee Office prior to taking the position as Eastern District Field Engineer. For the time being he will be located at 31 W. McBee Ave., Greenville, S. C.

Minneapolis-Honeywell Regulator Co. has opened a new office in South Bend. The new office is a sub-office under the Indianapolis branch and will be staffed by **Richard Stewart**, who is to be district representative for Honeywell controls, and **George Gilliam** who will supervise industrial instrument operations in that area. The office is located at 224 West Jefferson Street.

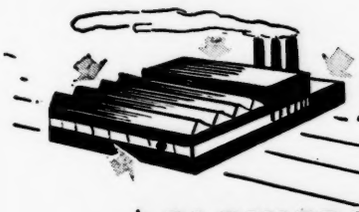
York Corp. has announced the formation of **York Distributors, Inc.**, a fully-owned subsidiary, to provide sales, installation, and service for York commercial air conditioning and refrigeration equipment in the New York area.

Two appointments to key posts in the mechandising department of **Airtemp Division, Chrysler Corp.**, have been announced. **Minor T. Dow**, former liaison specialist between the Dayton home office and various national

W. C. Bartels

M. T. Dow

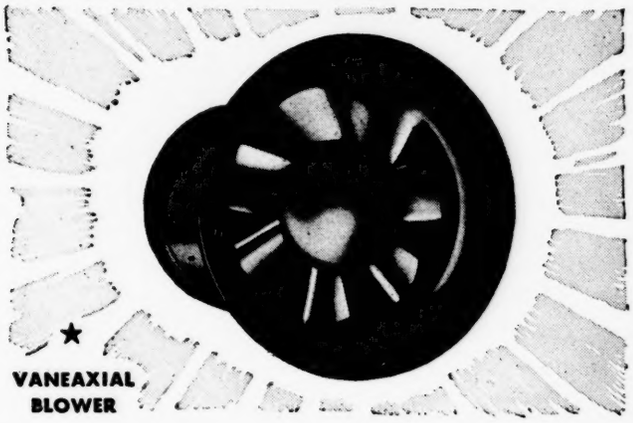
war agencies in Washington during the emergency period, has been appointed manager of sales training with headquarters at Dayton. Also announced is the addition to Airtemp's merchandising staff of **William C. Bartels**, formerly with Cutler-Hammer at Milwaukee and before that, advertising and sales promotion manager for many years at the Wisconsin Power & Light Co., Madison.



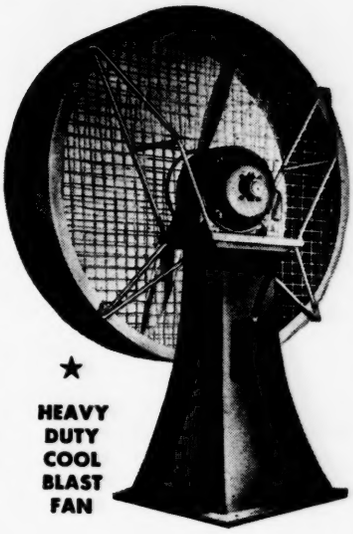
there's a HARTZELL FAN or BLOWER to solve YOUR Air-Moving PROBLEM..

★ BLOWERS

The new Hartzell Vaneaxial Blower is built to move air economically against the high pressures which long ducts, air filters and other industrial jobs involve. It gives you the startling efficiency of 87%. It operates economically against pressures up to 16" water gauge. It's quiet. Other Hartzell blowers move air against pressures of a quarter-inch and up. All come installed in a duct section for easy installation, all give you maximum air-delivery per power dollar. Send for Bulletin 1601.



★ VANEAXIAL BLOWER



★ HEAVY DUTY COOL BLAST FAN

★ FANS

The Heavy Duty Cool Blast Fan (shown left) is one of five Hartzell cooling and drying fans, each designed for lowest cost per foot of air moved under certain conditions. Throughout the Hartzell line there is a specific fan designed for each specific job. You don't have to adapt an "all-purpose" fan to *your* job. You get exactly the fan which will do *that one job*, and do it right, at least cost. And when you have Hartzell fans you just take reasonable care of them and let them operate. They don't break down, they don't hesitate, they don't lose efficiency. Let us send data on *your* air-moving problem.

Hartzell
PROPELLER FAN CO.
PIQUA DIV. OF CASTLE HILLS CORP. OHIO
ENGINEERING REPRESENTATIVES IN PRINCIPAL CITIES

Easy Way to Clean Coils of Evaporative Condensers

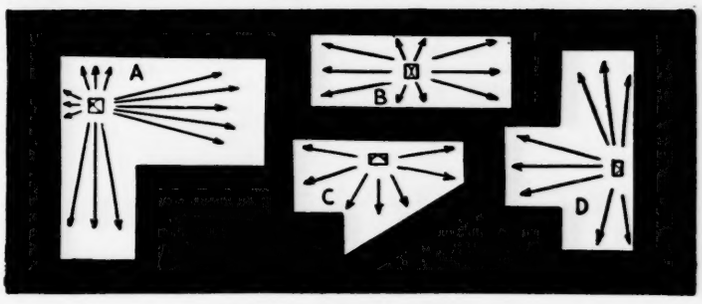
When exterior surfaces of coils in your evaporative condenser accumulate insulating deposits of slime and lime scale, cooling by sprays is hindered because water and air cannot make direct contact with metal surfaces of coils. Normal operating efficiency of unit is greatly reduced.

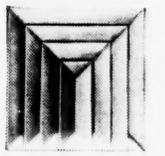
An easy, low-cost way to remedy this condition quickly is to remove slime and lime scale with Oakite materials specially designed for this purpose. Moreover, newly-developed Oakite Airefiner No. 52, added to water supplies in sump, provides an effective means of controlling and preventing formation of slime and lime scale deposits. A 4-page Service Report, free for the asking, gives you all the interesting details. Send for it today.

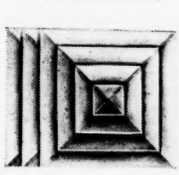
OAKITE PRODUCTS, INC., 58A Thames St., NEW YORK 6, N. Y.
Technical Service Representatives in All Principal Cities of the United States and Canada

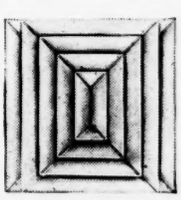
OAKITE MATERIALS METHODS SERVICE — Keep Buying Bonds — CLEANING FOR EVERY CLEANING REQUIREMENT

WHAT DIFFUSERS FOR THESE AREAS?









AGITAIR TYPE R AIR DIFFUSERS
FOR DIFFUSION PATTERN CONTROL

Perfect diffusion of air into all parts of odd-shaped rooms is available only with Agitair Type R Air Diffusers. And you don't need to mount type R in the center of the space.

That's because Agitair Type R, assembled from standard parts to any pattern desired, can divide the incoming air into one, two, three, or four streams, and diffuse these streams into the room in exact proportion to the areas they serve. Temperature differential and duct velocity are dissipated rapidly, noiselessly, draftlessly. Get the facts from Air Devices, Inc.

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TOTAL VICTORY

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Specialists in the development and manufacture of

fractional HP and miniature MOTORS	TACHOMETERS
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BLOWERS	CONTROL APPARATUS and SPECIAL DEVICES

We solicit engineering and production problems

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EASTERN AIR DEVICES • INC.

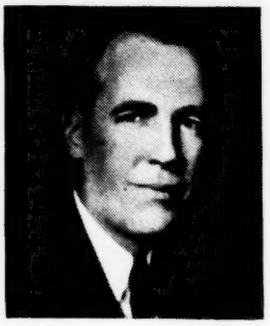
585 DEAN ST. • BROOKLYN 17, N. Y.

Election of **Geo. H. Miehls** as president of **Albert Kahn Associated Architects and Engineers, Inc.** to succeed the late Louis Kahn was announced in October. The board of directors also named Mr. Miehls, formerly executive vice-president, as treasurer of the 40-year-old firm.

At the same time **Sheldon Marston,** previously vice-president, was elected to succeed Mr. Miehls as executive vice-president, and two new vice-presidents were named: **Saul Saulson** and **O. L. Canfield.**

These men, together with **Robert E. Linton,** vice-president, and **Geo. K. Scrymgeour,** secretary, comprise the executive staff of the organization, said to be the largest in the world in industrial and commercial architecture and engineering.

G. H. Miehls



S. Marston

The new executive setup represents the culmination of a plan inaugurated by Albert and Louis Kahn well before the former's death in 1942. The brothers recognized that industrial architecture had advanced far beyond the capacity of any one man to administer its ramified and highly technical modern phases. They admitted 25 key men into the management group as "Associates", thereby broadening the firm's supervisory scope and assuring its perpetuation after the Kahns were no longer active.

The new officers take hold when the firm has more projects under way than in any previous peacetime year in its four-decade history. The projects represent new postwar construction work for the revitalization and expansion of American industry and commerce.

Mr. Miehls assumes the presidency after having been acting administrative head of the organization during the protracted illness of Louis Kahn prior to his death last September 1.

A native of Ohio, Mr. Miehls has spent his entire business career with the Kahn organization. After being graduated from Ohio State University in 1917 with a B.S.C.E. degree, he entered the army and spent 18 months overseas with the 23rd engineers.

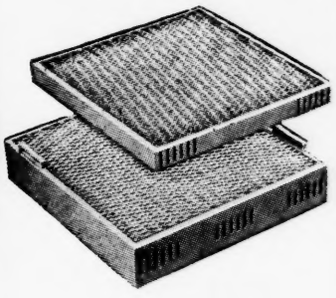
Immediately upon being mustered out in 1919 he went to work as a construction engineer with the Kahn organization and has served continuously with them since. He was project manager on some of the nation's largest war plants, including the Curtiss-Wright expansion program, and many others. He was named a vice-president in 1943 and made executive vice-president several months ago.

He and Mrs. Miehls reside in Rosedale Park, Detroit. A daughter is in her senior year at the University of Michigan and a son attends Redford High School. Mr. Miehls is a member of the Recess Club, the Engineering Society of Detroit and the Sigma Xi honorary Scientific Society.

Mr. Marston assumes his new duties as executive vice-president after having been named a vice-president in 1943. He is a mechanical and civil engineer and member of the Engineering Society of Detroit. Joining the Kahn organization in 1923, he advanced rapidly to a position as project manager.

Mr. Saulson entered the firm in 1913 and has been treasurer during the past three years. He is associate

FOR IMPROVED AIR FILTERING... GREATER CAPACITY ...REDUCED COSTS



Badger HEAVY DUTY PERMANENT INDUSTRIAL FILTERS

Specially Designed for extra heavy duty and industrial air cleaning services, the BADGER Heavy Duty Permanent Filter provides definitely improved air filtering, lower air resistance, greater dust-holding capacity, as well as reduced costs of maintenance. In addition, longer filter life is assured. Built in 2" and 4" sizes.

Write for Catalog—Prices

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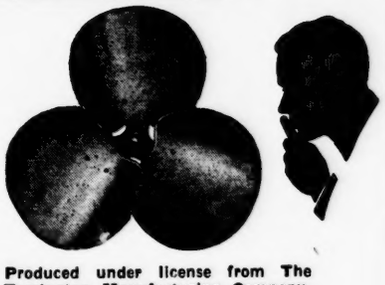
TRADE MARK REGISTERED

Quiet Props



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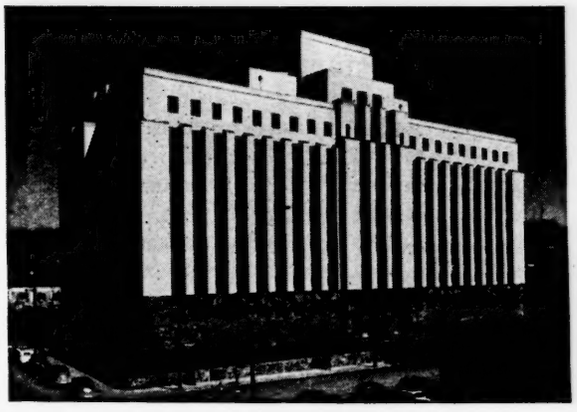
IMPROVE FAN PERFORMANCE

Yes, Meier Nu-Air Quiet Props . . . precisely designed and sturdily constructed, will sell any air motion unit. Near mirror finish aluminum blades are insulated from the cadmium plated spider and hub for smooth, quiet performance. All Nu-Air propeller blades are static balanced and guaranteed to be accurate. Available in sizes 10" to 54" and from 11° to 34° pitch.

To improve the performance of your ventilating equipment, use Nu-Air Quiet Props. We will be happy to send prices and technical data. Write for Bulletin No. 2100.

Meier ELECTRIC & MACHINE CO.
3525 E. WASHINGTON STREET
INDIANAPOLIS, INDIANA

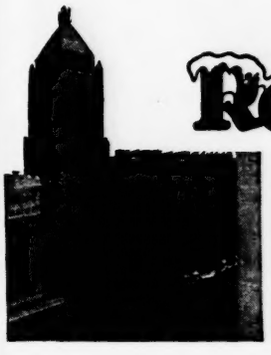


The Bankers Life Building, Des Moines, is Air Conditioned Throughout with Frick Refrigeration.

In Notable Buildings—

TRADE FRICK MARK

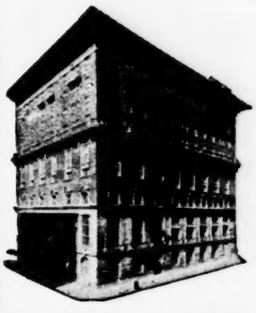
Refrigeration



The Philtower and Philcade Buildings at Tulsa are Air Conditioned with 1000 Tons of Frick Refrigeration.

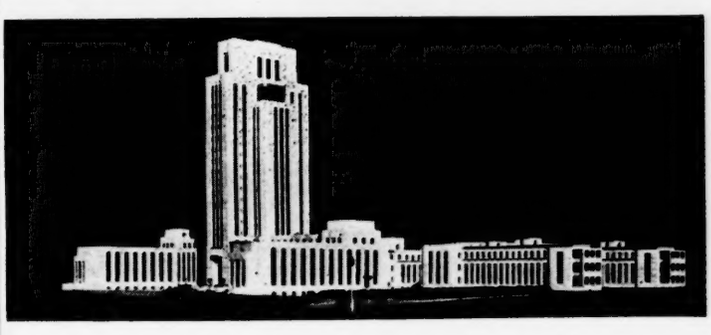
Provides half a dozen profitable services: conditioning air, cooling drinking water, dispensing beverages, making ice, freezing ice cream, and holding desired temperatures in any number of rooms and boxes—for furs, serums, flowers, candy, fruits, vegetables, meat, fish, poultry, dairy products, frozen foods, etc.

If the buildings in which you are interested need any of these cooling services, get in touch with your nearest Frick Branch or Distributor. Literature and estimates, cheerfully furnished.



The Missouri Athletic Asso., St. Louis, Uses 357 Tons of Frick Refrigeration for Air Conditioning, Ice Making, and Food Service.

FRICK COMPANY
Waynesboro, Penna.

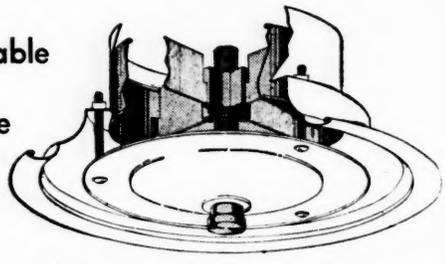


The Naval Medical Center at Bethesda, Md., has a Dozen Rooms Cooled with Frick Refrigeration, which also Supplies Cold Drinking Water and Air Conditioning.

Control of air direction and volume as an aid to satisfactory supply air diffusion

Whether they are used in heating, cooling, ventilating, or combined systems, KNO-DRAFT Diffusers can be adjusted quickly and accurately for system balancing and individual or seasonal requirements. As a result the factors of temperature variation, temperature fluctuation, drafts and noise can be minimized considerably.

Type K Adjustable Diffuser with Type D Volume Damper for supply air.



Pat. and pat. pending

Any desired condition at your fingertip.

Type SR Adjustable Diffuser for supply and return air.

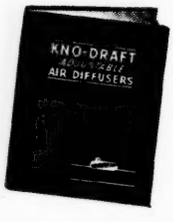
By simply turning the air adjustment screws (easily accessible from under the unit) the inner cone may be raised or lowered to secure any angle of air direction required. A built-in damper, with which either model can be equipped, varies the outlet aperture uniformly without affecting the outlet velocity or diffusion pattern. Thus, the air direction and volume of the same KNO-DRAFT Diffuser can be adjusted to be equally effective in expelling chilled air parallel to the ceiling or ejecting heated air downward to prevent stratification.

With KNO-DRAFT Adjustable Diffusers many engineers have been able to insure efficient air distribution, maximum premixing of room and supply air, noiseless and draftless diffusion and uniform temperature throughout the occupied zone. And they have been able to reduce labor and sheet metal costs by distributing large volumes of air at higher duct velocities in smaller, simplified ducts with fewer outlets, because KNO-DRAFT Diffusers permit the use of higher neck velocities.

The W. B. Connor Engineering Corp. maintains a staff of specialists and district representatives in leading cities to assist you with any air distribution problem.

FREE HANDBOOK

Contains clear sketches, charts, dimension prints and instructive text that simplify the selection and installation of air diffusers. For your copy write Dept. E-9.



W. B. CONNOR ENGINEERING CORP.

Air Diffusion *Air Purification* *Air Recovery*

114 E. 32nd Street — New York 16, N. Y.

chief engineer of the mechanical department, a member of the American Society of Mechanical Engineers and the Engineering Society of Detroit.

Mr. Canfield, a member of the firm since 1915, is a project manager and chief estimator.

Marshall B. Taft, formerly of the Aero Division, Minneapolis-Honeywell Regulator Co., has been made assistant to Henry F. Dever, president of the **Brown Instrument Co.,** Philadelphia industrial division of the Honeywell organization. Mr. Taft was for three years administrative assistant to the vice-president of the Aero Division in Chicago. Prior to that time he was practicing law in Minneapolis. He is a graduate of the University of Minnesota.

Leo B. McCoy has been appointed sales representative in the New Jersey territory for Janitrol gas-fired furnaces and burners, **Surface Combustion Corp.,** Toledo, Ohio, manufacturer of the equipment, announces. Mr. McCoy formerly was with the Public Service Electric and Gas Co. as a heating and air conditioning sales representative in Passaic, Hackensack and Rutherford, N. J., joining that company following his honorable dis-

C. H. Langendorf

L. B. McCoy

charge from the Army in 1943. He is working out of the New York district offices of Surface Combustion in his new position.

Carl H. Langendorf has been appointed sales and service engineer for its St. Louis territory, Surface Combustion Corp., announces. Mr. Langendorf was assistant office manager of McDonnell Aircraft Co. before returning to the Toledo organization with which he had been associated prior to 1943.

Mark H. Cummings has been appointed sales representative in the South Bend, Indiana territory for Janitrol gas-fired heating equipment, **Surface Combustion Corp., Toledo, Ohio,** manufacturer of the equipment, announces. Formerly in the space heating sales department of the Northern Indiana Public Service Co. at South Bend, Mr. Cummings has his residence in that city.

Harvey-Whipple, Inc., announces the appointment of **Leland W. Shaw** as purchasing agent.

The Ripley Co., of Torrington, Conn., announces the acquistion of all Goodyear rights to the low voltage riveting iron used for setting Du Pont explosive rivets which are widely used in blind applications and hard-to-reach places such as in duct work. The Ripley Company has also completed arrangements to produce the Du Pont No. 6 riveting iron. It will be sold by du Pont for production applications.

Appointment of **Reid B. Gray** as director of the Reynolds Research Institute, research subsidiary of the **Reynolds Metals Co.,** was announced by company president, R. S. Reynolds.

The Coolstream Corp., New York manufacturers of electric water coolers, presented their new line of stainless steel water coolers at a private showing in the Hotel New Yorker last month. **Lyonel Len Berken** is president and general manager of the corporation, **Bernard Leventhal**, chief engineer and treasurer, and **James J. Corey**, engineering consultant. Mr. Berken was born in Brooklyn in 1914 and received his education

J. J. Corey

L. L. Berken

B. Leventhal

at Columbia University, Pratt Institute, and New York University. He has had many years experience in engineering and sales and has designed and developed beer cooling and water cooling devices. Mr. Leventhal is a specialist in air conditioning and refrigeration and since 1940 has been doing special work in those lines for the Army and Navy Departments. Mr. Corey is the author of papers on liquid cooling and manuals on maintenance and installation. He was also a member of the American Coordinating Committee on Corrosion in 1940.

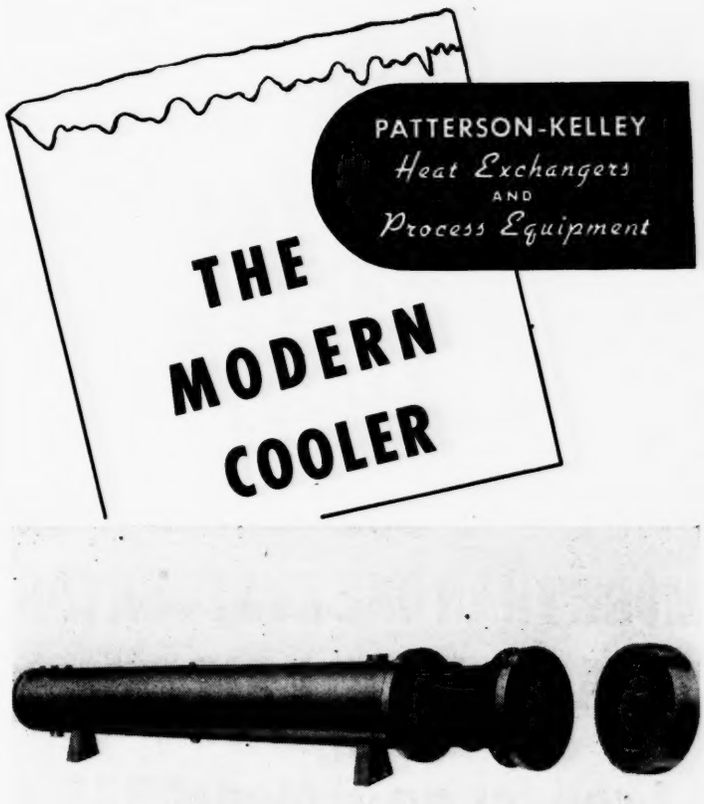
Thomas H. Langan has joined the Janitrol sales department of **Surface Combustion Corp.**, Toledo, O., the company announces. He is assistant to the manager of the Cleveland district office.

Henry M. Taylor has returned to **The Ruud Mfg. Co.**, makers of automatic gas water heaters, Pittsburgh, Pa., in the capacity of district manager for the State of Iowa. Mr. Taylor filled this same position with Ruud before the war but during wartime was on loan to the United States Department of Commerce. **A. J. Strain** has been appointed by Ruud Mfg. Co., as general manager of the Toronto plant.

Dr. E. N. Kemler, formerly Professor of Mechanical Engineering, Purdue University, has been appointed head of the newly created Engineering Research Division of the **Southern Research Institute**, Birmingham, Ala.

In announcing plans for the new Engineering Research Division, Dr. Lazier, the institute's director, said that the institute will ultimately have a specially equipped laboratory for investigations in mechanical and electrical engineering, and will have a staff competent to handle any problems in design and engineering analysis which may arise in connection with a well integrated program of sponsored research. The Engineering Research Division will occupy quarters separate from the main laboratory of the institute, which is now largely occupied with investigations in the physical sciences.

Dr. Kemler has been associated with several companies in a consulting capacity and was previously employed by Dodge Manufacturing Company, University of Pittsburgh, Gulf Research and Development Corp., and was in charge of production engineering for the Gypsy Division of Gulf Oil Company, Tulsa, Okla. During the war years he was engaged in teaching and research work for the Armed Forces at Purdue University.



for **FREON**

● The above photograph shows one of our recently constructed Water Coolers using Freon as the refrigerant. It's a combination of fine engineering and skillful manufacturing.

The design of such equipment calls for a thorough knowledge not only of the subject of heat transfer in general but of the behavior of coolants in particular. It calls for an understanding of the various metals and their behavior while in contact with refrigerants.

That Patterson-Kelley engineers have been called upon to design many coolers is evidence of their knowledge of refrigeration . . . and of their ability to serve you.

ARMY E NAVY

EST. 1890

THE PATTERSON-KELLEY Company, Inc.

EAST STROUDSBURG, PA.

BOSTON 16, 96-A Huntington Avenue • NEW YORK 17, 101 Park Avenue
PHILADELPHIA 3, 1700 Walnut Street • CHICAGO 4, Railway Exchange Building

Representatives in All Principal Cities

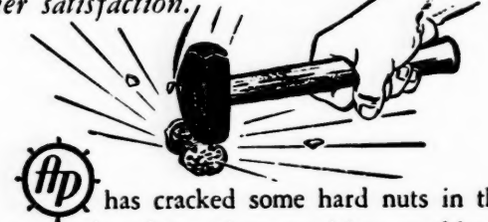
"WHEN A JOB CALLS FOR MORE THAN ONE EVAPORATOR ON A SINGLE UNIT . . . .

I call for an A-P Model 235 Suction Pressure Valve—

It's a good feeling to know what a valve can do . . . *and I know!*"

THAT is the comment from a Refrigeration Service Engineer when we asked him regarding his personal experience with "A-P" Valves.

Confidence like this is based on practical, day-in day-out experience in maintaining the nation's refrigerating machinery in spite of today's difficulties and handicaps. It is a trust shared by a widespread army of refrigeration service engineers who know that dependable "A-P" Controls, Valves, and Solenoids save them time-wasting call-backs — insure *customer satisfaction.*



A-P has cracked some hard nuts in the way of refrigeration servicing problems. Always feel free to consult us about yours!

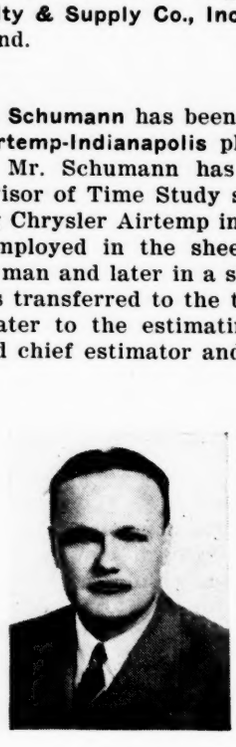
AUTOMATIC PRODUCTS COMPANY

2462 N. Thirty-Second Street Milwaukee 10, Wisconsin
Export Department — 13 East 40th Street, New York 16, New York

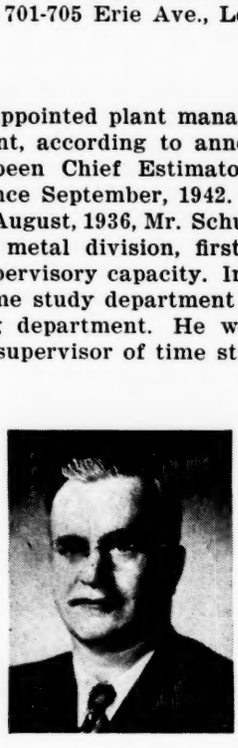
A-P DEPENDABLE REFRIGERANT VALVES

Appointment of a new representative and five distributors has been announced by **The Herman Nelson Corp.**, Moline, Ill. **E. H. Langdon Co.**, 966 Dexter Horton Bldg., Seattle 4, Wash., will operate as Herman Nelson representative in the Seattle-Tacoma territory. New Distributors are: **Industries Supply Co.**, 345 Fourth Ave., San Diego, Calif. Paul B. Rayburn, Jr., President; **Wisconsin River Supply Co.**, Wausau, Wis.; **Bond Supply** (Main Office), 522 N. Rose St., Kalamazoo 12, Mich. A. C. Rowen, President, and T. J. Hughes, Sales Manager; **Bond Supply Co.** (Branch), 54 Barney St., Battle Creek 14, Mich. W. Margeson, Manager; and **Baker Specialty & Supply Co., Inc.**, 701-705 Erie Ave., Logansport, Ind.

R. J. Schumann has been appointed plant manager of the **Airtemp-Indianapolis** plant, according to announcement. Mr. Schumann has been Chief Estimator and Supervisor of Time Study since September, 1942. After joining Chrysler Airtemp in August, 1936, Mr. Schumann was employed in the sheet metal division, first as a layout man and later in a supervisory capacity. In 1941, he was transferred to the time study department and a year later to the estimating department. He was appointed chief estimator and supervisor of time study in



R. J. Schumann



J. J. Donovan

September, 1942, the position he held until his recent promotion.

Appointment of **J. J. Donovan,** formerly New York regional manager of Airtemp, as eastern divisional manager for the company was also announced. Mr. Donovan's increased responsibility calls for coordination of all merchandising effort in the Boston, New York, Philadelphia and Washington regions, included in the eastern division. Robert Friedel moves up to succeed Donovan as New York regional manager, it was announced at the same time.

American Chain & Cable Co., Inc., Bridgeport, Connecticut, has acquired the business of the **Certified Gauge & Instrument Corp.**, of Long Island City, New York. The principal product of the latter company is a pressure gage with a new patented mechanism called the Helicoid movement. Manufacturing will continue at the Long Island City plant under the name Helicoid Gage Division, American Chain & Cable Co., Inc. As Helicoid Gages are used in the same general fields as two of American Chain & Cable's present lines, Reading-Pratt & Cady Valves and d'Este Automatic Regulating Valves, the acquisition of this new line will supplement the Company's products for markets it now serves.

Formation of a new branch office, to be known as the Peoria-Davenport Office, has been announced by **Minneapolis-Honeywell Regulator Co.** The Peoria-Davenport office will be under the management of Edward Thompson, formerly of the company's Kansas City branch.

Air conditioning and refrigeration specialists serving the **War Production Board** are now available to private industry, it is announced by John A. Warner, Director of Region 2, consisting of New York State and northern New Jersey. Employers desiring to interview air conditioning and refrigeration specialists are invited to write to the Regional Director, War Production Board, Empire State Building, New York 1, N. Y.

In colorful ceremonies on Oct. 9, the **Capitol Manufacturing and Supply Co.**, Columbus, Ohio, received the Army-Navy "E" Award for outstanding work in war production.

Clayton & Lambert Mfg. Co., Detroit, has purchased the plant, equipment and inventories of the **Hoffman Gas & Electric Heater Co.**, of Louisville, Ky., it was announced by Charles F. Lambert, president. The Louisville unit will be operated as heretofore as Clayton & Lambert's Hoffman Division, producing gas, electric and fuel oil water heaters. Enlargement of the Hoffman facilities are projected, he added, preparatory to increased heater output and, at the same time, to make provision at Louisville for the manufacture of other Clayton & Lambert products, including a gas-fueled household refrigerator.

It was announced that arrangements have been completed under which two companies in the Equity Group of investment companies have purchased for an undisclosed amount, control of the **Baker Ice Machine Co., Inc.**, of Omaha, Neb., and its subsidiary, **Northwest Baker Ice Machine Co.** of Seattle, from the Baker family and associated interests.

At the conference of the **ASHVE** held in Cleveland, October 8, papers were presented on The Relation of the Ventilating Engineer to Industrial Hygiene, by **H. C. Dyktor;** Transmission of Solar Radiation Through Flat Glass Under Summer Conditions by **George V. Parmelee;** and a New Friction Chart for Round Ducts by **D. K. Wright, Jr.** At a dinner meeting, President **C.-E. A. Winslow** spoke on The Air-Cooled Human Body.

The 1944 Annual Report of **Carrier Corp.** has been selected as "Best of Its Industry" by an independent board of judges composed of leading financial experts, it was announced by Weston Smith, vice-president of Financial World, which annually sponsors a nation-wide competition in this field.

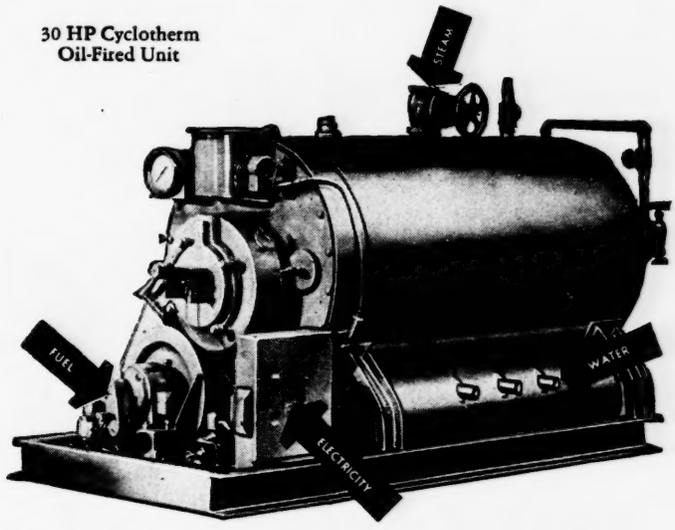
Bryant Heater Co., Cleveland, announces the appointment of **C. G. Allen** to its research and development staff. A graduate of Case School of Applied Science in metallurgy, Mr. Allen will devote his efforts primarily to experimental work in the development of new domestic gas heating equipment.

O. E. Nesmith, has been named director of engineering for the **Eureka Vacuum Cleaner Co.,** it was announced. Mr. Nesmith was previously chief engineer of the Williams Oil-O-Matic Heating Corp., which was recently merged with Eureka. Also announced were the appointments of **Ralph C. Osborn** as chief engineer of the Eureka division of the company, and **R. R. Potter,** as assistant chief engineer. **F. L. Pierce** will serve the company as a consulting engineer.

Elmer Lehmkuhl, formerly associated with Propellair, Inc., and the Master Electric Co., Dayton, Ohio, has been appointed sales manager of **Dynamic Air Engineering, Inc.,** Los Angeles., and will be responsible for sales to original equipment manufacturers.

Make 4 connections then put Cyclotherm to work

30 HP Cyclotherm Oil-Fired Unit



Your Cyclotherm Is Ready

Order your new post-war Cyclotherm now.

Cyclotherm is available *without* priority for fast delivery. Once your order is received action is immediate.

Your Cyclotherm comes to you a completely assembled, packaged unit. It needs no special foundation, or base; no stack. Installation consists only of connecting steam, water, fuel and electric lines. Your Cyclotherm can be producing steam in a matter of hours after delivery to you.

Cyclotherm units range from 5 HP to 200 HP with operating pressures from 15 psi to 200 psi. They are completely self-contained, automatic, oil or gas fired. They are designed on unique principles of combustion that give top efficiency while holding operating and maintenance costs to a minimum.

Thousands of Cyclotherm units were in war service throughout the world with the Army, Navy and Marine Corps. Their record of accomplishment is your best guarantee of the engineering "know-how" back of a Cyclotherm, and the quality built into every unit.

What the Veteran Cyclotherm did in the four corners of the world, the post-war Cyclotherm will do for you, whatever your use of steam may be.

Your order for a Cyclotherm will be filled promptly.

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Do it Quicker-Easier with Tal's Prestal Pipe Bender

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You start saving valuable working time and reduce material costs the day you use a Tal Prestal Pipe Bender. This efficient, easy to operate, portable machine reduces by 60% the need for fittings or welds. It bends ⅜" to 3" wrought iron or steel pipe up to 180°, cold, in one single, fast operation without moving the pipe, without heating or filling. With a Tal Bender you get a job to be proud of, neat, smooth, workmanlike, free from kinks or wrinkles. Hundreds of leading contractors already know that this best engineered, money making machine repays its low cost over and over every few months. Write for bulletin . . . today!

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The only Distributor with the patented curved-vane construction which imparts a circulator motion to the air . . . the Distributor which effectively mixes room air with conditioned air . . . the Distributor which speedily establishes a uniform temperature WITHOUT DRAFT!

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Harold J. McKay has been appointed service engineer in the New York district for Janitrol gas-fired space heating equipment, **Surface Combustion Corp.**, Toledo, Ohio, manufacturer of the equipment, announces. Headquarters for Mr. McKay will be with Surface Combustion's New York district offices, Transportation Building, 225 Broadway. The new Janitrol engineer formerly was with the Brooklyn Union Gas Company.

The Westinghouse Electric Corp., Pittsburgh, Pa., announced it would purchase property and buildings in Meadville, Pa., for the production of industrial heating equipment. The property, comprising more than five acres of land and five major buildings with more than 100,000 feet of floor space, is being purchased from Talon, Inc., after the boards of directors of both companies approved the sale this week, said L. B. McCully, manager of the Westinghouse Transportation and Generator Division. The entire Westinghouse line of industrial heating equipment will be produced in the Meadville plant, including many types of furnaces and other devices for heat-treating, driers, immersion heaters, space heaters and thermostats.

At the annual meeting of the Association of Gas Appliance and Equipment Manufacturers, **Lyle C. Harvey** was re-elected president for the year beginning October 1, 1945 and ending September 30, 1946. Mr. Harvey is president of the **Bryant Heater Co.**, Cleveland, Ohio, and vice-president and director of **Dresser Industries, Inc.**

Cochrane Corp. of Philadelphia, manufacturers since 1863 of steam power plant and industrial equipment has been acquired by a group of men long associated with the company in the engineering and sales divisions. The new corporation will be managed and operated by its owners. **T. E. McBride** was elected president and the following men named as vice-presidents: **C. E. Joos,** apparatus division; **V. A. Rohlin,** works manager; **A. E. Kittredge,** chief engineer, and **E. S. Daugherty,** heater division. The board of directors includes **H. E. Sibson,** for many years the company's general sales manager, and **W. V. Sauter** of Philadelphia. There will be no change in the Cochrane line or sales policies, nor in the nation-wide sales representation of the company.

The Midwest Research Institute, Kansas City, announces the addition of the following eight new members to its technical staff, which brings the total personnel of the Institute to seventy-one:

Dr. Robert R. Hancox, physicist, formerly on the staff of the Armour Research Foundation, Chicago, and more recently with the Western Electric Company, Chicago; **Dr. Robert W. Shortridge,** formerly with the Monsanto Chemical Company, Dayton, Ohio; **Lorenzo D. Moore,** formerly of the Koppers Company, Inc., Kearny, New Jersey, where he specialized in synthetic rubber production; **John Affleck,** who received his bachelor's degree in physics this year from Rockhurst College, Kansas City; **Jerome Brewer,** from the staff of the University of Chicago, where for the past eighteen months he participated in the development of the atomic bomb; **Carl R. Johnson,** who recently was discharged from the Navy after three and one-half years' service; **George W. Swehla,** civil engineer and cartographer, who has been on the staff of the City Plan Commission, Kansas City; **Miss Louise T. Alderman,** formerly assistant chemist, American Can Company, Maywood, Illinois.

For the sixth time **Handy & Harman,** New York, N. Y., were honored with the Army-Navy "E" Award. This last award was made just as World War II came to an end.

Getting Personal

G. K. Marshall

George K. Marshall *(Selection of Cooling Coils*, page 81) attended the U. S. Naval Academy, graduating in 1933. Following graduation he entered the General Electric student engineering course at Schenectady, N. Y., and upon completing the course was employed in the engineering department of the S. S. Fretz Co., Philadelphia, Pa., a G. E. air conditioning distributor. Later he served as chief engineer of General Roofing and Air Conditioning Corp., Charleston, W. Va., another G. E. distributor.

His next transfer was to the G. E. factory branch at Detroit, first as service branch manager, and then as application engineer and industrial sales engineer.

When the United States entered the war, Mr. Marshall was recalled to the G. E. factory at Bloomfield, N. J., where he became a specialist in industrial low temperature and heat transfer applications. He is now engaged in postwar commercial development of heating and heat transfer equipment.

John Kane

John Kane *(Design of Exhaust Systems*, page 68) received his B.S. in Mechanical Engineering from the University of Kentucky in 1933. He has been with the American Air Filter Co., Louisville, Ky., since 1933, and from 1936 has been supervising engineer of the dust control division. Mr. Kane has written extensively on the subject of dust control and has presented papers to the National Safety Congress, American Foundrymen's Association, and local chapters of many national engineering societies.

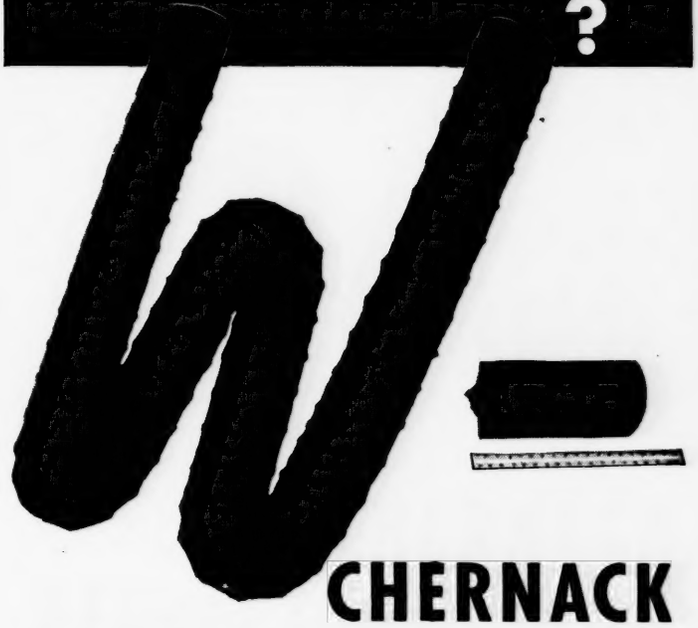
Air Filtration

Air Filtration in Central Systems is the title of a 24-page manual on that subject prepared for architects, design and maintenance engineers covering the application of Dust-Stop filters. The booklet presents data on dimensions, ratings, manufacturing tolerances, efficiencies, and installation of these Fiberglas air filters.—*Owens-Corning Fiberglas Corp., Toledo, Ohio.*

Electric Water Coolers

An 8-page illustrated booklet describing two types of electric water coolers—one the pressure bubbler model, and the other a bottle type cooler.—*The Coolstream Corp., 55 W. 42nd St., New York 18, N. Y.*

WHERE CAN YOU USE THIS UNIQUE NEW MATERIAL ?



CHERNACK RETRACTABLE DUCT

What it is

A specialized tubing designed to meet the many industrial requirements for a readily portable duct connection for cold or heated air. Light in weight, yet strong and durable. Flexible to a high degree, which permits its use around sharp corners and over obstructions. Stowable into a small space when not in use. When made of light weight fabric, a fifteen foot length can be stowed in a one foot container. When made of heavier fabrics this ratio is somewhat reduced.

Where it has been used

Typical applications on which this type of tubing has been used successfully include airplane engine preheaters, conducting fresh air into ship holds, ventilating tanks, cars and other enclosed spaces, and portable heaters used in temporary buildings, tents and like enclosures.

Why it may prove valuable to you!

Many variations in construction are possible, depending upon the application. The number of spirals can be increased or decreased from standard, which is four per foot length. Many types of flexible material can be used, ranging from light weight cotton or synthetic fabrics to heavy canvas duct. Fabrics may be impregnated where desirable.

Specifications

Standard Inside Diameters: 4 in., 6 in., 8 in., 10 in., and 12 in. Other diameters made to specification.

Temperature of heated air up to 300° F.

Lengths: 2 feet to 50 feet.

Ratio of retractability: 15 to 1 for standard weight material.

End terminations to suit requirements.

For further information write direct to us outlining the applications in which you are interested. We will be glad to submit our recommendations.

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Stainless Steels

An 8-page booklet gives the forms, specifications and standards for all types of stainless steel including hardenable, non-hardenable, and austenitic chromium steels. Tables show properties and applications of each type.—*Jessop Steel Co., Washington, Pa.*

pH and Chlorine Control

A completely revised edition of the Taylor combination handbook and catalog, contains both simple and technical explanations of the meaning of pH control; specific discussions of the application of pH, chlorine and phosphate control to 35 industries, including air conditioning and water treatment; the precautions to be observed in making determinations; and descriptions of all Taylor outfits, including 8 new sets. Copy free on request.—*W. A. Taylor & Co., 7300 York Road, Baltimore 4, Md.*

Piping Joints

The Silbraz Joint—the connection that actually bonds I.P.S. copper tubing and brass pipe into a single "one-piece" pipe line—is described in Airco's new 16-page, 2-color booklet: "How to Cash in on the Silver Ring." The booklet shows how Silbraz Joints are made from patented bronze pipe fittings, valves and flanges—containing a factory inserted ring of silver brazing alloy in each port opening. The literature shows that when brass pipe or I.P.S. copper tubing is properly inserted in these fittings and the assembly is brazed, the resulting joint is stronger than the pipe itself . . . a joint that is leakproof; that will not creep or pull apart under any pressure which the pipe itself can withstand. — *Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.*

Pipe Outlet Fittings

A new 16-page catalog contains application and structural data, installation procedure, specifications, and list prices of Bonney WeldOlet fittings for making full-pipe-strength, permanent, leakproof branch pipe outlets. The catalog also illustrates and describes WeldOlet Drain-Out fittings and the complete line of Bonney flanges.—*Bonney Forge & Tool Works, Forged Fittings Division, Allentown, Pa.*

Cellular Rubber

Four-page pamphlet, 845-21, describes various forms in which sponge rubber, bonded fibre and other sub-density materials are manufactured. Illustrates ninety-eight molded, die cut and fabricated shapes of flexible, elastic compressible products used for cushioning, shock absorption, vibration dampening, sealing, insulating, gasketing, etc.—*Sponge Rubber Products Co., Derby Place, Shelton, Conn.*

Water Separator and Filter

The new Excel-So Separator, a unit that removes water and dirt from petroleum products in refineries, gasoline plants, pipelines and chemical plants, is described in the new bulletin EX-101.—*Flotrol Systems, Inc., 385 Gerard Ave., New York 51, N. Y.*

Air Exhausters

The Agitair wind-actuated, weatherproof exhauster—a unit that can be mounted atop any building, vent, or even horizontally to suck hot, stale air, steam or odors out of the building when only a slight breeze is blowing from any direction—is described in the new 12-page, 8½ x 11 in. Bulletin EX-101.—*Air Devices, Inc., 17 East 42nd St., New York 17, N. Y.*

COMING EVENTS

NOVEMBER 14-16—Conference on heating, housing and fuels, sponsored by the Division of Fuel Technology of the School of Mineral Industries at The Pennsylvania State College, State College, Pa. Conference will consist of five sessions dealing with housing needs, basic elements of construction for heating with solid fuels, advances in heating equipment, engineering and research developments, and merchandizing trends. Further information from Dr. H. B. Charmbury, Mineral Industries Bldg., State College, Pa.

NOVEMBER 26-30—Annual Meeting of the American Society of Mechanical Engineers at the Hotel Pennsylvania, New York City. C. E. Davies, Secretary, 29 W. 39th St., New York 18, N. Y.

DECEMBER 10-12—Annual meeting of the American Society of Refrigeration Engineers, Hotel Pennsylvania, New York City. David L. Fiske, Secretary, 40 W. 40th St., New York 18, N. Y.

JANUARY 28-30, 1946—52nd Annual Meeting of the American Society of Heating and Ventilating Engineers, to be held at the Hotel Commodore, New York City. C. V. Hutchinson, Secretary, 51 Madison Avenue, New York.

FEBRUARY 25-28, 1946—National Association of Home Builders' Exposition, to be held at the Stevens Hotel, Chicago. Further information from Paul S. Van Auken, Convention and Exposition Director for the Association, 111 W. Jackson, Chicago.

FEB. 25-MAR. 2, 1946—20th Exposition of Chemical Industries, to be held at Grand Central Palace, New York City. Further details from C. F. Roth, manager of the Exposition, Grand Central Palace, New York 17, N. Y.

MARCH 4-7, 1946—Open meeting of Refrigeration Equipment Manufacturers Association membership with refrigeration jobbers and service engineers, at the Stevens Hotel, Chicago. For further information address Theodore R. Sills, Refrigeration Equipment Manufacturers Association, 43 East Ohio Street, Chicago 11, Ill.

APRIL 23-27, 1946—A National Oil Heating Industry Exhibition of automatic heating products, at Commercial Museum, Philadelphia, Pa. Details to be announced later by Oil-Heat Institute of America.

MAY 7-9, 1946—Annual meeting and convention of the National Association of Corrosion Engineers, with headquarters in the President Hotel, Kansas City, Mo. In addition to technical programs there will be an exhibtion of corrosion-resistant, corrosion-mitigation and various types of protective materials in the Main Arena of the Municipal Auditorium.. Further information from Elton Sterrett, executive secretary, 318 Southern Standard Building, 711 Main Street, Houston 2, Texas.

MAY 20-25, 1946—National Marine Exposition to be held at Grand Central Palace, New York City, under the sponsorship of the Propeller Club of the United States. Further information from Roger E. Montgomery, general manager, National Marine Expositions, Inc., 17 Battery Place, New York, N. Y.

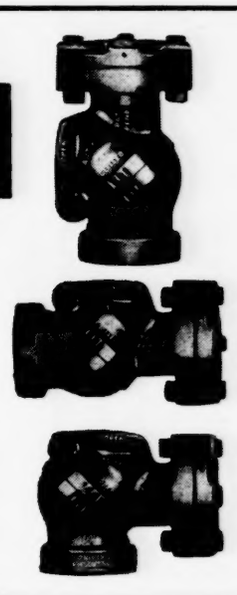
OCT. 28-NOV. 1, 1946—REMA annual all-industry refrigeration and air conditioning show to be held in the Cleveland Public Auditorium, Cleveland, Ohio. Further information from Refrigeration Equipment Manufacturers Association, 43 East Ohio Street, Chicago 11, Ill.

NEW TRIPLEX PRODUCTS give further assurance of HOT WATER AT ITS BEST!

NEW VERTICAL CIRCULATOR

—of modern streamline design. Precision gauge construction for smooth, dependable operation. Close fit of balanced inlet impeller in body bore assures unusually high pumping efficiency. Spring-mounted vertical sleeve bearing motor with automatic reset overload relay. Electrical knockout box prevents noises. All parts interchangeable with those of similar model and number. In 1", 1¼", 1½", and 2" pipe sizes (horizontal model for 2½" and 3" sizes).

NEW UNIVERSAL FLOW CONTROL VALVES



One stock meets all needs. Here's why: Valve seat and cover casting are divided at 45° angle—and assembled in line for use on horizontal or vertical mains, or at 90° for angle pattern installation. Four socket-head cap screws (easily removed for angle change) seal gasketed surfaces. Dependable valve mechanism (brass seat and closure cover) attached to external control knob. Complete units are of precision gauge construction and styled for modern eye appeal. In 1", 1¼", 1½", 2", and 3" iron pipe sizes.

With these outstanding new items of advanced design and construction added to its dependable standard line, Triplex offers precision-made equipment necessary to meet modern demands—and gives further assurance of hot water heating at its best! Write today for facts and prices.

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